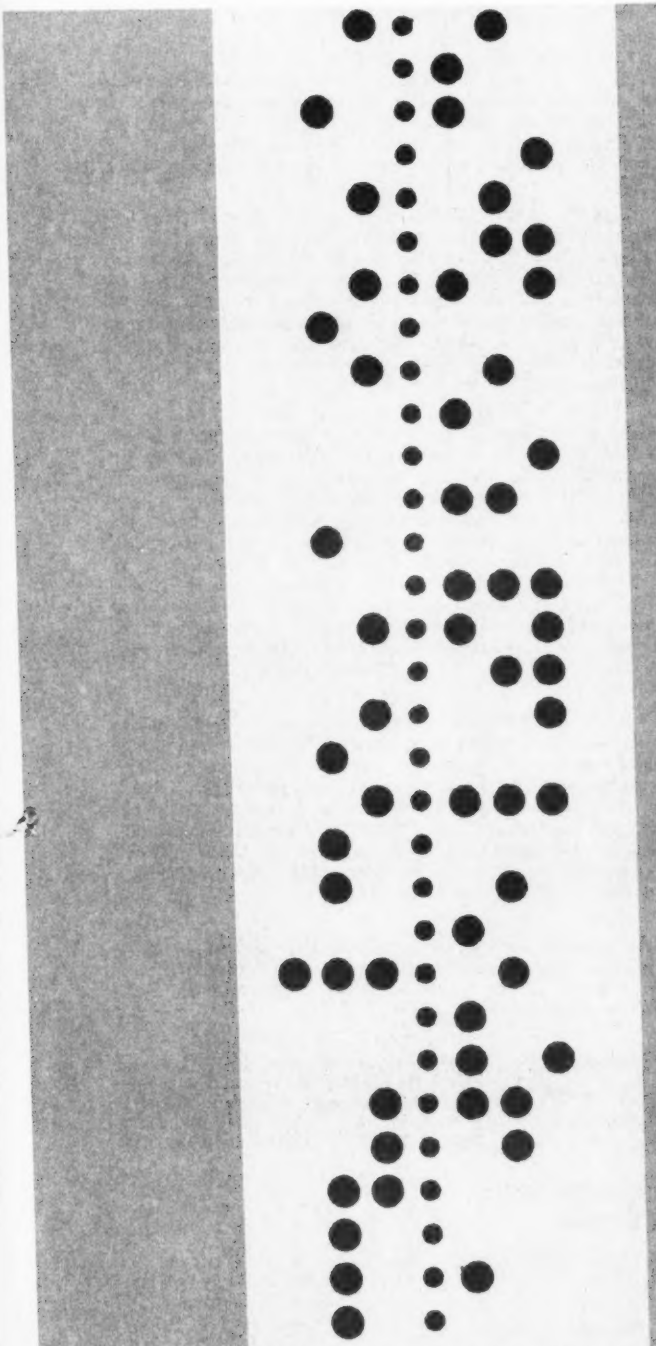
July 5, 1965

U.S. GOVERNMENT RESEARCH & DEVELOPMENT REPORTS



A Semi-monthly

Abstract Journal

for

Science and

Industry

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U. S. DEPARTMENT OF COMMERCE / NATIONAL BUREAU OF STANDARDS / INSTITUTE FOR APPLIED TECHNOLOGY

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U.S. Government

RESEARCH AND DEVELOPMENT REPORTS

Issued twice a month by the Clearinghouse for Federal Scientific and Technical Information. Annual subscription $15 ($3.75 additional for foreign mailing). Single copy $1. Make remittance payable to Superintendent of Documents and mail either to a U.S. Department of Commerce Field Office or to Superintendent of Documents, U.S. Government Printing Office, Washington, D. C. 20402. Address changes should be sent to Superintendent of Documents.

PURPOSE

U.S. GOVERNMENT RESEARCH AND DEVELOPMENT REPORTS is published by the Clearinghouse for Federal Scientific and Technical Information to announce the availability of new reports of U.S. Government-sponsored R&D released by the Department of Defense and other Federal agencies. Included are reports from the Atomic Energy Commission and the National Aeronautics and Space Administration, which issue separate announcement journals as noted below.

FORMAT

USGRDR contains two sections with a combined table of contents. The first section, "Technical Abstract Bulletin" (TAB), announces reports released by the Defense Documentation Center (DDC) of the Department of Defense. The second section, "Other Research Reports and Related Material," announces reports released by civilian agencies and also includes certain older military reports. Reports are listed by accession/report number under 22 major subject category headings. Both sections contain abstracts and complete bibliographic citations and are followed by their respective indexes. Reports of current high industrial interest are featured in "Research Highlights."

HOW TO USE

Readers are urged to review all abstracts in their fields of interest, noting accession/report numbers and titles of reports to be ordered. Although primarily for retrieval, the descriptors provide a quick grasp of a report's scope. The reader is reminded that reports applicable to his field may be found under various subject category headings; the various indexes will aid in locating those reports. A single reference guide to new Government-sponsored technical literature, *Government-Wide Index to Federal Research and Development Reports*, is compiled monthly by the Clearinghouse from the combined indexes of this journal, *Nuclear Science Abstracts* (AEC), *Scientific and Technical Aerospace Reports* (NASA), and *Technical Abstract Journal* (DDC). This combined index is available from Superintendent of Documents, U.S. Government Printing Office, annual subscription $10, ($2.50 for foreign mailing) or $1.25 single copy.

TO ORDER REPORTS

All reports announced herein are available to the general public from the Clearinghouse, or in some cases from other sources as noted. To order Clearinghouse reports, use accession/report number (as given on the first line of each entry) and title from the Clearinghouse, U.S. Department of Commerce, Springfield, Va. 22151, or from any Commerce Field Office (listed on inside back cover). Prices for hard copy (HC) and microfiche copy (MF) are given for each entry. Prepayment is required unless purchases are to be charged to Clearinghouse deposit accounts. Order forms will be found in the back. Make check or money order payable to National Bureau of Standards—CFSTI.

OTHER JOURNALS

Reports of the National Aeronautics and Space Administration and the Atomic Energy Commission can be ordered from the Clearinghouse. They are abstracted in the following journals available from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

NUCLEAR SCIENCE ABSTRACTS, Atomic Energy Commission, $30 a year domestic, $37 foreign, $1.75 single copy plus 25 percent foreign mailing.

SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS. National Aeronautics and Space Administration, $33.00 a year domestic, $42.00 foreign, $2.50 single copy plus 25 cents foreign mailing.

U.S. DEPARTMENT OF COMMERCE
John T. Connor, Secretary

CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION
Springfield, Va. 22151
Bernard M. Fry, Director

Contents may be printed freely. Mention of source will be appreciated.
Use of funds for this publication approved by the Director of the Bureau of Budget, June 30, 1961.

special ANNOUNCEMENTS

NEW ANNOUNCEMENT CATEGORIES FOR USGRDR

Beginning with this issue of USGRDR the subject arrangement for report announcements is changed to conform with the COSATI Subject Category List. The List has been prepared by the Task Group on Language Compatability operating under the direction of the Committee on Scientific and Technical Information (COSATI) as a uniform subject arrangement for 1) announcement and distribution of scientific and technical reports and 2) management reporting.

The List is a two-level arrangement consisting of 22 major subject fields further subdivided into 178 groups. The group structure is not presently used, but is included in the table of contents to provide some clarity to the major fields.

Adoption of the COSATI arrangement for the display of report announcements is in keeping with Clearinghouse interests toward achieving a more uniform system of subject categorizing report literature.

The COSATI list is not to be confused with the "industrial category list" now being used by the Clearinghouse in "Research Highlights" to group and announce R and D information under 49 categories that are of special current interest to industry.

NEW DEPOSIT ACCOUNT SYSTEM

Establishment of a new deposit account system for the purchase of Clearinghouse documents has become necessary because of the increased use of Superintendent of Documents deposit accounts for this purpose.

While deposit account customers may be inconvenienced initially, we believe that the new system, developed in cooperation with the Superintendent of Documents, will enable us to improve customer billing services and to process document orders more quickly and efficiently.

Changes in the system, effective July 1, are:

1. Clearinghouse purchases can no longer be charged to 'regular' Superintendent of Documents deposit accounts (numbered under 75,000), although these accounts should be maintained by customers who purchase documents from the Superintendent of Documents (GPO).

2. A 'special' deposit account must be opened for the purchase of Clearinghouse documents--the account will be assigned a number above 75,000. This account can be used only for Clearinghouse documents.

3. To establish a Clearinghouse deposit account, send a minimum deposit of $25 to the Clearinghouse, U. S. Department of Commerce, Springfield, Virginia, 22151, ATTN: Code 410.60.

4. Once a month the Clearinghouse deposit account holder will receive a statement of his account showing the opening balance, the cost of orders completed, deposits received, and closing balance. In addition to the monthly statement, as each order is filled the customer will receive a receipted copy of our order control form showing documents shipped, total cost, and deposit account charge made.

5. Customers who do not wish to establish a Clearinghouse deposit account must send payment for documents with their orders.

We hope that customers will take advantage of the Clearinghouse deposit account system, since it will assist us in providing customers with accurate and fast service and it will reduce--for both customers and the Clearinghouse--the clerical work involved in handling orders.

RESEARCH highlights

Reports of current high industrial interest

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Biological and Medical Sciences

RECOVERY OF CELLS FROM EFFECTS OF RADIATION

(Order AD-614 267 Elimination of Sulfur Mustard-Induced Alkylation Products From DNA of Escherichia Coli, HC $1.00/MF 50 cents.)

Eliminating ultraviolet light-induced thymine dimers from deoxyribonucleic acid (DNA), a phenomenon of certain bacterial strains, also exists in bacteria that have been exposed to sulfur mustard. According to the Army's Edgewood Experimental Medicine Division, 'This process may have great significance in the recovery of cells from the effects of the radiation.' The Edgewood study notes that in view of the pronounced similarities of the biological actions of ultraviolet light and radiomimetic alkylating agents (inhibition of cellular DNA synthesis, initiation of posttreatment degradations of DNA, filament formation, cross-resistance or cross-sensitivity of some mutant strains) other types of DNA damage might also be eliminated. If this is true, the excision phenomenon might be considered as part of a general mechanism for repairing genetic defects. With this in view, biologists looked into sulfur mustard and Escherichia coli and reached these conclusions: Sulfur mustard -- bis (2-chlorethyl) sulfide -- treated Escherichia coli, $15T^{-}A^{-}U$ (thymine-, arginine-, and uracil-requiring), depolymerize a significant portion of their DNA during posttreatment metabolism. The rate of loss of sulfur mustard products initially bound to DNA is more rapid than the rate of overall DNA degradations. Also, several sulfur mustard-DNA alkylation products (including monofunctionally and bifunctionally alkylated guanine) are eliminated to equal extents. In conclusion, sulfur mustard-treated bacteria recover the capacity to synthesize DNA. This is suggestive of a causal relationship between the excision of alkylation products from DNA and resumption of DNA replication.

Communications

TESTS OF DIGITAL TRANSMISSION SYSTEMS

(Order AD-614 775 Testing of Digital Data Transmission Systems, HC $3.00/MF 75 cents.)

Army investigators testing digital transmission systems say the probability of reception of messages with errors cannot be reduced to zero, but means are available for eliminating the possibility of unknowingly accepting an erroneous message. Often errors appear in clusters, and are caused by such things as operator mistakes, faulty maintenance, equipment failures, interference, propagation effects, and background noise. The average error rate is less descriptive and less important than the time distribution of errors. The communication channel should and can be specified in a manner that clearly reflects the user requirements and accurately describes the engineering goal of the communication system designer. Error detection and retransmission must be considered as prime techniques to be used. Forward error correction may be useful in optimizing the communication system for data transmission.

Electronics

INFRARED DISCLOSES RELIABILITY OF MINIATURE ELECTRONIC CIRCUITS

(Order AD-615 018 A High-Speed Infrared Mapping System for Reliability Assessment of Miniature Electronic Circuits, HC $1.00/MF 50 cents.)

A high-speed infrared mapping system that can reliably tell whether individual components of electronic miniature circuits are faulty has been developed by Navy researchers. Reliability of the apparatus has been established at temperatures of 60 to 70°C--well below the temperatures considered to be destructive of electronic materials and parts. Thus the device is a nondestructive testing tool and fills a need of electronic engineers who at present lack satisfactory means for rapidly testing mounted miniature circuit components. The system consists of a cryogenically cooled infrared detector, a scanning mechanism, electronic circuitry, and a modified facsimile machine. Researchers say a thermal map of a 1-in.-sq. circuit surface can be made in a 30-minute period. Mapping resolution is sufficient to display large IR energy level changes occurring in a 0.001-in.-sq. circuit area. The energy changes would of course disclose the presence of a faulty component, since the chief cause of parameter change, performance degradation, and eventual failure of electronic circuit components is known to be excessive heat dissipation.

FLAT DIODES AS MINIATURE PRESSURE GAGES

(Order AD-615 300 Tunneling Junction Diode Pressure Gage, HC $2.00/ MF 50 cents.)

Tunneling junction diodes for use as miniature pressure gages have been fabricated from arsenic-doped germanium by the Army's Harry Diamond Laboratories. They have a resistivity of 0.001 ohm-cm and have been tested under hydrostatic pressures up to 10,000 psi. These 'flat' diodes differ from ordinary tunnel diodes in that the peak-to-valley ratio has been reduced to one or less by increasing the excess and diffusion currents with high temperature alloying and increased alloying times. A negative resistance region appears only at low temperatures. According to the Army developers, this type of flat-characteristic, two-terminal diode is useful as a constant-current device when the peak-to-valley ratio is one, and as a variable range pressure gage when the peak-to-valley is one or less by using the pressure dependence of the tunneling current. A singular advantage of these diodes is that they need not satisfy the strict stability requirements of the amplifier mode as does the usual tunnel diode when it is used in this manner. Furthermore, bulky low inductance mounting is no longer needed. 'It is now possible,' say the Harry Diamond developers, 'to take full advantage of the extremely small size of these diodes, the working area of which may be as small as 0.003 in. diameter. Gage factors of 350 were achieved and the change in peak current with pressure was shown to be comparable with that of Esaki diodes.'

RESIDUAL GASES PROBLEM IN ELECTRONIC DEVICES

(Order AD-615 449 Factors Influencing Ultrahigh Vacuum in Microwave Electron Devices, HC $1.00/MF 50 cents.)

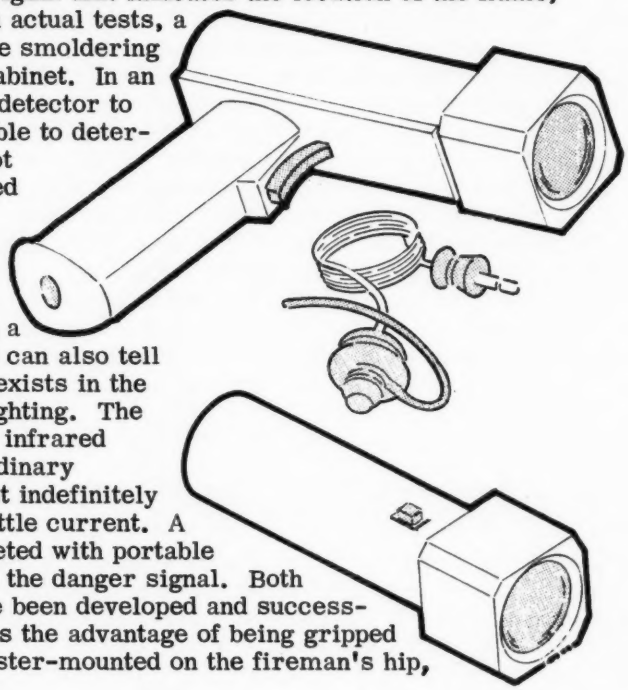
The problem of residual gases in microwave electronic devices is of primary importance for device performance and reliability. It is usually given secondary attention by the designer, says a Fort Monmouth report, and this is a mistake. For instance, the initial effects of residual gases in complex microwave electronic devices can almost instantaneously adversely affect the cathode emission, beam focusing, output power, noise level, and internal vacuum. In addition, irreparable damage can be done to internal precision components which can result in the premature failure of the devices. To avoid catastrophic failure, the report continues, the complex problems associated with the design of complex devices therefore demand a knowledge of the metallurgical, electrical, mechanical, chemical and physical behavior of the preferred fabrication materials. The designer must know about the interactions of gases with solid surfaces so that an analysis of the materials and methods of device fabrication can be made. This is now possible on a rapid and scientifically accurate basis because of recent advances in the state-of-the-art of partial pressure mass spectrometer systems.

For example, if the designer knows the diffusion, adsorption, and desorption properties of the materials to be used in the device, an evaluation can be made prior to its construction. Many design difficulties which might later appear could be eliminated by judiciously preselecting device materials and the methods of processing the device components fabricated from these materials. The Monmouth publication specifically discusses the problem with respect to adsorption, desorption, and the composition, sources, and types of residual gases as factors that influence ultrahigh vacuum in microwave electronic device fabrication.

HEAT-SEEKING DEVICE LOCATES HIDDEN FIRES

(Order AD-615 634 Pre-Prototype Hand-Held Fire Detectors, HC $2.00/ MF 50 cents.)

A remarkably simple and easy-to-handle heat-seeking device that tells firemen where to look for hidden fires has been developed for Civil Defense authorities by the Singer Co. The device works just as well in smoke-filled areas as in rooms or buildings where no evidence of fire or smoke is apparent. All that is necessary is for the fireman to point the flashlight-size device around a room and listen for a signal that indicates the location of the flame, ember, or other heat source. In actual tests, a fireman used the device to locate smoldering rags behind a huge metal wall cabinet. In an auto fire a firefighter using the detector to scan under the dashboard was able to determine that the doused fire was not entirely out. Firemen who tested the device for Civil Defense authorities are enthusiastic about the sensor's potential. It can, for example, indicate where live embers still exist in a smoke-filled gutted building. It can also tell where the most dangerous fire exists in the early detection stages of fire fighting. The device is officially known as an infrared detector. It is powered with ordinary flashlight batteries that will last indefinitely because the device uses very little current. A small earphone, like that marketed with portable radios, is used to communicate the danger signal. Both flashlight and pistol styles have been developed and successfully tested. The pistol type has the advantage of being gripped more readily, and it can be holster-mounted on the fireman's hip, ready for use in an emergency.



Power Source Devices

RADIO DISTRESS TRANSMITTER

(Order AD-615 153 Emergency Distress Signaling Devices, HC 50 cents/ MF 50 cents.)

A magnesium sea-water battery with a tunnel diode inverter to step up the voltage appears best of all available devices to serve as a power source for audio distress transmitters. Navy developers say it is inexpensive, reliable, and has an indefinite shelf life requiring little or no maintenance. The device is sufficiently rugged to survive a crash and it is automatically activated. It also has a lifetime adequate for location by search parties, and the power source can be applied to produce audio, radio, or visual signals. The Naval Research Lab study notes the need for an emergency signaling device, as a surprising number of lost aircraft go undetected for long periods of time even though they crash in close proximity to large cities. Although this study was mainly concerned with developing such a device, researchers also gave consideration to a suitable power source and developed a transmitter using vhf operation for such service.

RESEARCH REVIEWS PACKAGED for INDUSTRY

by

The Institute for Applied Technology
NATIONAL BUREAU OF STANDARDS

Highlighted here are seven recent issues in the series, A Review of Selected U. S. Government Research and Development Reports.

The publications contain resumes, abstracts and bibliographies of Federally sponsored research and development reports gathered under titles of special interest to industry.

They and the reports they refer to may offer ideas for product development or suggest means of reducing costs. The series, as well as most of the reports reviewed in it, are available from the Clearinghouse. New titles are in process. Please order by OTR number.

FLUID AMPLIFIERS

(Order OTR-112 Fluid Amplification, available free from the Clearinghouse.)

Fluid amplifiers are still in an early stage of development, but considerable Government R and D effort is being expended toward their use in military and space applications where the potential advantages outweigh the development costs. Government effort is aimed at describing theory and developing design procedures, assemblies, fabrication methods, instrumentation, and power supplies. While the bulk of the reports available from the Clearinghouse on this effort is obviously military and space oriented, OTR-112, a review prepared by the NBS Institute for Applied Technology, concludes that they should be useful also to those interested in civilian technological progress. The review notes that amplification involves the control of a powerful flow of some medium by a weaker force. A fluid amplifier uses a fluid such as water or air. It has distinct advantages over electronic counterparts in that it can operate in extreme environments such as high heat, high radiation, and high vibration and shock, which are often incompatible with electronic devices. In addition, a no-moving-parts amplifier is possible for control purposes, thereby cutting down on maintenance and repairs because there are no parts to break down. Like electronic counterparts, fluid amplifiers can also be cascaded so that one component acts as a preamplifier for the succeeding stage.

ULTRASONIC FABRICATION

(Order OTR-113 Ultrasonic Fabrication, available free from the Clearinghouse.)

Significant Government R and D efforts in ultrasonics have recently been directed toward gaining greater understanding of deformation characteristics of metals, toward developing applications in wire drawing, rolling, and welding of refractory metals, and toward perfecting fabrication of transistors. For example, work has been completed on making beryllium more useful as a structural material by perfecting techniques for joining beryllium by ultrasonic welding apparatus. Ultrasonic welding also can provide an effective and durable seal for aluminum containers without much attention required for surface cleanliness to achieve sound welds. Steel ingots have been grain refined by the application of vibrational energy during solidification, and investigators conclude that grain refinement of weld metals by the application of vibrational ultrasonic energy holds promise in metalworking. Ultrasonics can also increase joining speeds, lower joining forces, and improve surface finishes without affecting the properties of fabricated parts. These and many other useful findings developed in Government projects are described in OTR-113, a review prepared by the NBS Institute for Applied Technology.

ULTRASONIC TESTING

(Order OTR-114 Ultrasonic Testing, available free from the Clearinghouse.)

Government agencies have made considerable progress in developing the theory and practice of ultrasonic testing of materials. OTR-114, a review prepared by the NBS Institute for Applied Technology, describes recent Government R and D in this area, which has proceeded along these three lines: development of instruments, techniques, and standards; applications of ultrasonics to measuring stress and fatigue; and applications to filament-wound structures, nuclear reactor elements, and concrete structures. One program on techniques for defect evaluation, for example, determined optimum beam collimation techniques for detecting defects in certain materials and displaying the defects. Another program on flaw detection determined improved ultrasonic bond inspection equipment for detecting flaws in laminations of materials that have greatly dissimilar acoustical properties. A program on standards developed techniques and standards for ultrasonic testing of filament-wound reinforced resin-glass structures. Reports on these and other Government projects described in the Review are available at the cost of reproduction from the Clearinghouse.

HIGH ENERGY METAL FORMING

(Order OTR-115 High Energy Forming, available free from the Clearinghouse.)

For the past several years, Government agencies have made considerable progress in the field of high energy metal forming. As a result, this technique has rapidly become recognized as feasible for a variety of metalworking operations. OTR-115, a review prepared by the NBS Institute for Applied Technology, describes the Federal R and D work in three major lines: studies of the basic parameters of metal behavior; studies of extrusion, cutting, welding, and compaction; and development of electro- and hydro-spark methods. Reports presenting the results on research in these areas that are listed and described in the review, are available at the cost of reproduction from the Clearinghouse. One report, for example, indicates a potential exists for joining ceramic to itself and dissimilar materials by fusing a metal interface. Another report indicates that for mild-steel plates, high values of forming strains increased the nominal tensile strength and yield strength 50 and 100 percent respectively, and the forming strain at these maximum levels of strength causes a decrease of 30 percent in reduction of area. A report on sheet metal forming presents information on basic theories and the effects of velocity, temperature, and pressure on forming. It also discusses basic procedures and the application of theory in the sheet forming process.

NUMERICAL CONTROLS FOR MACHINE TOOLS

(Order OTR-116 Numerical Controls, available free from the Clearinghouse.)

Though the original goal of Government-sponsored research in numerical control of machining tooling was to enhance machine-tool capacity for the Nation's defense effort, this R and D has spread to many commercial users, both domestic and foreign, and is being lauded as an area with almost unlimited potential. The review, prepared by the NBS Institute for Applied Technology, describes recent research that has progressed in these areas: programming for control, tool controlling, retrofitting to numerical controls, evaluating fabricated forging dies, and applying the technology in the shipyard. The review indicates that during the second quarter of 1964, the number of NC machine tools shipped was up 44 percent over the first quarter, and by June 1964 NC machine tools had accounted for nine percent of the value of industrial type metalworking tool shipments. Automatic Programming for Tools (APT), Adapting APT (ADAPT) and Computer-Aided Design are examples of computer-based approaches designed to eliminate large portions of human effort to produce complex mechanical shapes automatically, accurately, and economically. Applied research has developed adaptive control--a method for controlling cutting tool motion and wear by monitoring and altering cutting parameters automatically. The reports describing these and other developments that are discussed in the review are available from the Clearinghouse at the cost of reproduction. OTR-116 is cited on page S-27

DIELECTRIC FILMS IN MICROELECTRONICS

(Order OTR-117 Dielectric Films in Microelectronics, available free from the Clearinghouse.)

The rapid advances in thin-film technology have accelerated the demands for thin-film devices with dimensions on the order of less than 2 microns. The devices have improved reproducibility, a high degree of reliability, and a capability of operating under a wide range of temperatures. To meet these demands, extensive efforts have been made to improve the existing dielectrics and to further refine fabrication processes. Significant strides have been made in improving yields and in defining the effects of various parameters on the electrical characteristics of the dielectrics. At the same time, preliminary research of promising dielectrics has revealed the depth of the many problems that have to be overcome. Successful fabrication of circuits using thin-film dielectrics attests to the feasibility of the process. A large segment of this research effort is being supported by Federal agencies, and reports are available from the Clearinghouse describing the results of the research. The review, prepared by the NBS Institute for Applied Technology, lists and describes reports on: (1) investigations of suitable materials for use as a dielectric; (2) analyses of the parameters involved in attempting to obtain a reproducible process; (3) refinement or development of dielectric fabrication techniques; (4) substantial testing of selected dielectric materials; (5) improvements of existing thin-film dielectrics; and (6) fabrication of circuits utilizing selected thin-film capacitors. OTR-117 is cited on page S-27

FIBER OPTICS

(Order OTR-118 Fiber Optics, available free from the Clearinghouse.)

Although the field of fiber optics is still relatively new, recent Government-sponsored research has resulted in advances. Not only has progress occurred in theoretical understanding, but some simple experimental devices using optical fibers have been produced. This review, OTR-118, prepared by the NBS Institute for Applied Technology, describes progress in theory and development as well as hardware. The reports issued by institutions conducting the research are listed and described in OTR-118 and are available from the Clearinghouse. In general terms, fiber optical technology is that discipline that uses the visible and infrared portion of the electromagnetic spectrum to perform optical functions heretofore impossible. For example, it is often desirable to transfer electrical signals from one circuit to another by means other than electrical interconnection. Logical operations, impedance transformation, and switching encountered in digital computers may soon be accomplished without any electrical connection between the circuits. The varying signals encountered in communication and telemetry applications may also be transmitted through the use of optical techniques. These are a few of the objectives of Government-sponsored work in this area. OTR-118 is cited on page S-53.

OTHER TITLES IN THE OTR SERIES
(Free From The Clearinghouse)

OTR-101	Hot Machining	OTR-106	Humidity-Controlled Warehousing
OTR-102	Nickel-Titanium Alloys	OTR-107	Concrete Technology
OTR-103	Photochromism and Phototropism	OTR-108	Volatile Corrosion Inhibitors
OTR-104	Fire-Extinguishing Material Technology	OTR-109	Grease Lubrication
OTR-105	Flame-Retardant Textiles	OTR-110	Thermoelectric Materials and Fabrication
		OTR-111	Integrated Circuitry

The abundance of R/D reports available creates a problem for industry in extracting those most likely to prove of value--for technical solutions and in keeping up with new developments. These Clearinghouse tools and services, and others planned, are designed to narrow the search.

PINPOINTING R&D REPORTS

Selection Aids For Industry

▶ GOVERNMENT-WIDE INDEX appearing monthly is a single reference guide to Government-sponsored research and development announced in four of the major technical announcement journals of the Federal Government: USGRDR, Technical Abstract Bulletin of the Defense Documentation Center, Nuclear Science Abstracts of the Atomic Energy Commission, and Scientific and Technical Aerospace Reports of the National Aeronautics and Space Administration. (Annual Subscription $10, $2.50 additional for foreign mailing, $1.25 single copy.) Available from Superintendent of Documents, U.S. Government Printing Office, Washington, D. C., 20402.

▶ SELECTIVE BIBLIOGRAPHIES--from Abrasives to Zirconium--will be mailed free. A list of more than 200 available from the Clearinghouse will be mailed on request. Here is a sample list of ten:

SB-441 Materials Testing	SB-523 Batteries
SB-444 Electronic Miniaturization	SB-524 Expanded Plastics
SB-480 Textile Fibers	SB-526 Metal Composites
SB-515 Paper	SB-529 Hydrofoil Boats
SB-518 Paints and Varnishes	SB-541 Fluid Amplifiers

▶ LITERATURE SEARCHING SERVICE provides two kinds of bibliographies:

a) Current Awareness on selected fields of interest on a periodic basis.
b) Retrospective, listing the literature available to date.

These searches are made to order using the combined facilities of the Clearinghouse, the Science and Technology Division of the Library of Congress and the science collections of the Departments of the Interior and Agriculture, or any combination of these facilities at $11 an hour (8 hours minimum searching time).

▶ FAST ANNOUNCEMENT SERVICE reviews reports of special industrial significance. Announcements are classified and mailed by industrial category. No charge.

▶ RESEARCH REVIEWS are packaged R/D report summaries, abstracts and bibliographies gathered under titles of industrial interest. Seven are reviewed in this issue in "Research Highlights." No charge.

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08 EARTH SCIENCES AND OCEANOGRAPHY

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10 ENERGY CONVERSION (Non-Propulsive)

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Includes air conditioning, heating, lighting, and ventilating; civil engineering; construction equipment, materials, and supplies; containers and packaging; couplings, fittings, fasteners, and joints; ground transportation equipment; hydraulic and pneumatic equipment; industrial processes; machinery and tools; marine engineering; pumps, filters, pipes, tubing, fittings, and valves; safety engineering; and structural engineering. See also related fields: 07 Chemistry and 09 Electronics and Electrical Engineering..... 86, S-40

14 METHODS AND EQUIPMENT

Includes cost effectiveness; laboratories, test facilities, and test equipment; recording devices; reliability; and reprography..... 91, S-44

15 MILITARY SCIENCES

Includes antisubmarine warfare; chemical, biological, and radiological warfare; defense; intelligence; logistics; nuclear warfare; and operations, strategy, and tactics. See also related fields: 16 Missile Technology and 17 Navigation, Communications, Detection and Countermeasures..... 97, S-46

16 MISSILE TECHNOLOGY

Includes missile launching and ground support; missile trajectories; missile warheads and fuzes; and missiles. See also related fields: 01 Aeronautics, 17 Navigation, Communications, Detection, and Countermeasures, 19 Ordnance, 21 Propulsion and Fuels, and 22 Space Technology..... 99

17 NAVIGATION, COMMUNICATIONS, DETECTION, AND COUNTERMEASURES

Includes acoustic detection; communications; direction finding; electromagnetic and acoustic countermeasures; infrared and ultraviolet detection; magnetic detection; navigation and guidance; optical detection; radar detection; and seismic detection. See also related fields: 09 Electronics and Electrical Engineering and 20 Physics..... 100, S-47

18 NUCLEAR SCIENCE AND TECHNOLOGY

Includes fusion devices (thermonuclear); isotopes; nuclear explosions; nuclear instrumentation; nuclear power plants; radiation shielding and protection; radioactive wastes and fission products; radioactivity; reactor engineering and operation; reactor materials; reactor physics; reactors (power); reactors (non-power); and SNAP technology. See also related fields: 07 Chemistry, 15 Military Sciences, 18 Nuclear Science and Technology, 20 Physics, and 21 Propulsion and Fuels..... 105, S-48

19 ORDNANCE

Includes ammunition, explosives; bombs; combat vehicles; explosions, ballistics, and armor; fire control and bombing systems; guns; rockets; and underwater ordnance. See also related field: 18 Nuclear Science and Technology..... 108, S-51

20 PHYSICS

Includes acoustics; crystallography; electricity and magnetism; fluid mechanics; masers and lasers; optics; particle accelerators; particle physics; plasma physics; quantum theory; solid-mechanics; solid-state physics; thermodynamics and wave propagation. See also related fields: 03 Astronomy and Astrophysics, 07 Chemistry, 09 Electronics and Electrical Engineering, 10 Energy Conversion (Non-propulsive), 11 Materials, 13 Mechanical, Industrial, Civil, and Marine Engineering, and 17 Navigation, Communications, Detection, and Countermeasures..... 109, S-52

21 PROPULSION AND FUELS

Includes air-breathing engines; combustion and ignition; electric propulsion; fuels; jet and gas turbine engines; nuclear propulsion; reciprocating engines; rocket motors and engines; and rocket propellants. See also related fields: 07 Chemistry and 20 Physics..... 127, S-56

22 SPACE TECHNOLOGY

Includes astronautics; spacecraft; spacecraft trajectories and reentry; and spacecraft launch vehicles and ground support. See also related fields: 01 Aeronautics, 03 Astronomy and Astrophysics, 16 Missile Technology, 17 Navigation, Communications, Detection, and Countermeasures, and 21 Propulsion and Fuels..... 130, S-57

TECHNICAL ABSTRACT BULLETIN

01. Aeronautics

AD-615 207 Div. 09/5

Firestone Flight Sciences Lab., Calif. Inst. of Tech., Pasadena.
A CORRELATION OF CONVECTIVE HEAT TRANSFER AND RECOVERY TEMPERATURE DATA FOR CYLINDERS IN COMPRESSIBLE FLOW,
by C. Forbes Dewey, Jr. 20 Aug 64, 8p
Pub. no. 598
Contract DA31 124ARO D33
Unclassified report

Pub. in International Journal of Heat and Mass Transfer v8 p245-52 1965 (Copies available only to DDC users).

Descriptors: (*Correlation techniques, Aerodynamic heating), (*Heat transfer, Cylindrical bodies), (*Compressible flow, Cylindrical bodies), Convection, Fluid mechanics, Continuum mechanics, Reynolds number, Transport properties.

AD-615 212 Div. 09/5, 09/6, 25/8
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
TEMPERATURE OF A PLATE IN A SUPERSONIC FLOW WITH RADIATION TAKEN INTO ACCOUNT,
by I. N. Sokolova. 5 Apr 65, 25p FTD-MT-64-307
TT 65-62212
Unclassified report

Edited Machine trans. of mono. Sbornik Teoreticheskikh Rabot po Aerodinamike (Collection of Theoretical Works on Aerodynamics) Moscow 1957 p206-21.

Descriptors: (*Flat plate models, Temperature), (*Supersonic flow, Flat plate models), (*Thermal radiation, Flat plate models), Thermal conductivity, Laminar boundary layer.

A method is given for calculating the influence of radiation in the computation of temperature of a plate streamlined by a flow of gas of high speed. These cases are considered: (1) absolutely heat-conducting plate, (2) absolutely nonheat-conducting plate, and (3) plate of finite thermal conduction. It is shown that at high Mach numbers, radiation strongly lowers the temperature of the plate. Graphs and tables necessary for the calculations are presented. (Author)

AD-615 265 Div. 01/1
CFSTI Prices: HC$2.00 MF$0.50

National Aviation Facilities Experimental Center, Atlantic City, N. J.
EVALUATION OF BAROMETRIC ALTIMETRY AT LOW ALTITUDE.
Final rept.,
by Donald J. Bourque. Jan 65, 31p
Proj. 320 205 01V
SRDS RD-65-7 Unclassified report

Descriptors: (*Altimeters, Barometric pressure), Low altitude, Errors, Level flight, Approach, Jet transport planes.

An evaluation was conducted to determine the mean and standard deviation of errors in determining a height of 100 feet above the runway by utilizing the barometric altimetry systems aboard the Federal Aviation Agency Boeing 720 (N-113) and Convair 880 (N-112) on Instrument Landing System (ILS) approaches. Operational altimetry system errors were determined by taking the difference between altimeter indicated height recorded by airborne cameras and aircraft altitude recorded by phototheodolites. Corrections for the altimeter setting error and the flight manual value of the error of the static system were applied to the operational altimetry system error to obtain the calculated altimetry system error. Based on the results of the evaluation, it was concluded that a height of 100 feet could have been determined during descent to an average standard deviation of 5.2 feet and 7.7 feet for the Boeing 720 and the Convair 880 respectively, and during level flight to an average standard deviation of 6.5 feet and 8.4 feet for the Boeing 720 and the Convair 880 respectively, provided the barometric altimetry systems were corrected by the amount of the mean error for each case. (Author)

AD-615 273 Div. 25/8
CFSTI Prices: HC$2.00 MF$0.50

Harry Diamond Labs., Washington, D. C.
EQUILIBRIUM THERMODYNAMIC PROPERTIES OF AIR BEHIND INCIDENT NORMAL SHOCK WAVES,
by Harry J. Davis. 30 Mar 65, 41p
Rept. no. TM-65-17
Projs. 30300, 1P010501A008
Unclassified report

Descriptors: (*Thermodynamics, Air), (*Air, Thermodynamics), (*Tables, Thermodynamics), Chemical equilibrium, Shock waves.

The equilibrium temperature, density, and pressure of air behind incident normal shock waves have been calculated. The resulting tables include the effects of chemical reactions, excitation, dissociation, ionization, van der Waal and Coulomb forces. The tables are presented as functions of the ratio of the density behind the shock wave to the density at standard conditions in steps of 0.2. The temperature behind the shock wave T2 is a parameter which ranges from 2000K to 16,000K in 1000K steps. Two sets of tables, for initial conditions of 273.15 and 300.0K, are presented. The densities of air, as a real and as an ideal gas, are compared. (Author)

AD-615 280 Div. 09/7
CFSTI Prices: HC$3.00 MF$0.75

Boeing Scientific Research Labs., Seattle, Wash.
OBSTACLE-INDUCED FLOW RECIRCULATION,
by G. K. Timm. Mar 65, 73p
Flight sciences Lab. rept. no. FSL-94, D1-82-0423
Unclassified report

Also available from the author.

Descriptors: (*Ground effect, Flow visualization), (*Flow visualization, Ground effect), Jets, Wedges, Prismatic bodies.

The results of a series of tests studying obstacle-induced flow recirculation are presented. A small scale rotor creates a slipstream which impinges on a ground plane and then encounters an obstacle. The principal test technique is that of flow visualization using sawdust particles, but in addition some power measurements are made. (Author)

AD-615 286 Div. 01/2
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE L-29 AIRPLANE,
by V. Podolnyi, S. Petrov, and L. Sokolov-Sokolenck.
23 Apr 65, 10p FTD-TT-64-1236
TT 65-62274

Unclassified report

Unedited rough draft trans. of Kryla Rodiny (USSR) v15 n9 p24-5 1964.

Descriptors: (*Aircraft, Aerodynamic characteristics), Aerodynamic configurations, Flight control system, Flight speeds, Flight instruments, Performance (Engineering), Maneuverability.

Details on the aerodynamic configuration, flight characteristics, and aircraft systems are given for the L-29 aircraft.

AD-615 326 Div. 09/5
CFSTI Prices: HC$2.00 MF$0.50

Cincinnati Univ., Ohio.
A SIMPLIFIED ANALYSIS OF VECTORIAL INJECTION IN HYPERSONIC FLOW.
Interim technical rept.,
by Philip S. Kirk. Mar 65, 40p
Contract AF33 616 8453, Proj. 7064
ARL 65-50

Unclassified report

Descriptors: (*Hypersonic flow, Laminar boundary layer), (*Aerodynamic heating, Reduction), Friction, Heat transfer, Injection, Fluids, Mathematical analysis.

The equations relating to laminar binary boundary layer flow are solved approximately, in accordance with the boundary conditions for vectorial injection. Expressions for the skinfriction and heat transfer coefficients are derived, together with their normalized representations. (Author)

AD-615 385 Div. 09/7, 04/4
CFSTI Prices: HC$2.00 MF$0.50

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
SPECTROSCOPIC STUDIES OF VIBRATIONAL NONEQUILIBRIUM IN SUPERSONIC NOZZLE FLOWS.
Interim rept.,
by I. R. Hurle, A. L. Russo, and J. Gordon Hall.
Jan 65, 37p Rept. no. CAL-AD-1716-A-5
Contracts AF33 657 8860, AF49 638 792, Proj. 7065, Task 706507
ARL 65-6

Unclassified report

Descriptors: (*Nozzle gas flow, Supersonic nozzles), (*Molecular spectroscopy, Nonequilibrium flow), Nitrogen, Shock waves, Relaxation time, Transport properties, Excitation, Thermochemistry, Fluid dynamic properties.

Studies have been made of the extent of vibrational nonequilibrium produced in supersonic expansions of undissociated N2 from known initial equilibrium conditions attained behind reflected shock waves. The N2 was shock heated and compressed to reservoir temperatures and pressures in the ranges 2800 to 4600K, and 24 to 82 atm. It was then allowed to expand through a 15 degree axisymmetric nozzle coupled to the end of the shock tube. The extent of vibrational nonequilibrium was determined by measurements of local vibrational temperatures using the spectrum-line reversal method. The measurements showed the vibrational temperatures in the expansion flows to be much closer to equilibrium than the Landau-Teller relaxation theory predicts. Observations at two area ratios showed that the flow was not completely frozen in the vibrational sense. The probability of N2 vibrational de-excitation inferred from these measurements of vibrational relaxation made behind normal shock waves. Reasons for this apparent difference are discussed in terms of the basic environmental and kinetic differences between shock-wave and nozzle-expansion flows. The validity of the application of Landau-Teller relaxation assumptions and shock-tube measured rates to predict nonequilibrium in expansion flows is thus questioned. (Author)

AD-615 419 Div. 01/1, 19/3
CFSTI Prices:HC$3.00 MF$0.75

Airborne Instruments Lab., Inc., Deer Park, N. Y.
ILS FLIGHT CHECK SYSTEM.
Final rept.,
by D. J. Creber. Jan 65, 96p Rept. no. 1783-1
Contract ARDS565, Proj. 341 001 03N
SRDS RD-65-5

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Instrument landings, Feasibility studies), Optical equipment, Electronic equipment, Tests.

System feasibility checks, prior to NAFEC tests, on the Guide Light System show that it has high resolution and a reasonably good range and, depending on the results of accuracy tests, appears to be a promising technique for flight checking the accuracy of ILS installations. On a bright sunny day, the Guide Light System operating range was found to be about 3-1/2 nm; on a clear night, the range was about 5-1/2 nm. Ground tests showed that the course shift as a function of range was negligible. The Guide Light System that was designed and constructed consists of a ground station and an airborne flight-check receiver. At the ground station, the light from a 1-kilowatt tungsten-filament source is split into two light bands (infrared and visible) and modulated by a rotating drum. The flight-check aircraft receiver demodulates the light beams and, by measuring the phase angle between the demodulated audio signals, determines the in-space angular location of the aircraft. Angular information is contained in a 0.6-degree-wide beam symmetrically spaced about the center-line.

AD-615 420 Div. 33/1, 14/6, 33/2
CFSTI Prices: HC$4.00 MF$0.75

Monsanto Research Corp., Dayton, Ohio.
CHEMICAL MEANS FOR PREVENTION OF ACCUMULATION OF ICE, SNOW, AND SLUSH ON RUNWAYS.

Final rept.,
by Jay C. Harris, J. R. Gibson, and D. Street. Mar 65, 109p
Contract FA WA4577, Proj. 430 006 01R
SRDS 65-13

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Runways, Snow removal), (*Ice prevention, Runways), Roads, Corrosion, Stresses, Concrete, Steel, Chemicals, Potassium compounds, Phosphates, Calcium compounds, Chlorides, Amides, Acids, Organic compounds, Grasses.

The objective of this contract was to develop a mixture capable of melting snow, ice, and slush at temperatures as low as -10F. Two surviving candidate mixtures were demonstrated as easily prepared in simple, standard mixing equipment, and their storage characteristics as free flowing granules determined at two temperature extremes. The application rate to produce melting at -10F was quite nominal (2 oz/sq ft), and the compositions had at most slight spalling effect on concrete. The prime candidate for runway deicing has the following composition: Tripotassium phosphate 75% - formamide 25%. A second combination proved outstanding for preventive corrosion of steel not under the potentially high stress of landing gear. Quite suitable for road or highway usage was calcium chloride to which was added 1% by weight of Emulsifier STH. This composition retained all its ice-melting qualities with marked corrosion control. (Author)

AD-615 428 Div. 09/5
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
EFFECT OF PRESSURE PULSATIONS IN A GAS FLOW ON CONVECTIVE HEAT EXCHANGE,
by S. I. Kosterin, I. A. Kozhinov, and A. I. Leont'ev.
5 Apr 65, 17p FTD-TT-64-1065
TT 65-62284

Unclassified report

Unedited rough draft trans. of Teploenergetika (USSR) v6 n3 p66-72 1959.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Heat transfer, Convection), (*Pressure, Heat transfer), Aerodynamic characteristics, Thermodynamics, Turbulent boundary layer, Gas flow, Turbulence, Integral equations, USSR.

Results of theoretical and experimental investigation of convective heat exchange in the presence of longitudinal pressure pulsation in a gas flow are described. (Author)

AD-615 442 Div. 01/5, 16/10
CFSTI Prices: HC$5.00 MF$1.00

Technology, Inc., Dayton, Ohio.
STUDIES ON VERTEBRAL INJURIES SUSTAINED DURING AIRCREW EJECTION.
Final rept.,
by Lawrence S. Higgins, Stuart A. Enfield, and Robert J. Marshall. May 65, 152p Rept. no. TI-65-041
Contract Nonr467500, Proj. NR102 646

Unclassified report

Descriptors: (*Aviation injuries, Spinal column), (*Ejection seats, Aviation injuries), (*Pilots, Aviation injuries), Ejection, Hazards, Aircraft, High altitude, Design, Acceleration tolerance, Flight speeds, Aviation safety, Safety harness, Parachutes, Vibration, Jettisonable cockpits, Human engineering, Flight testing.

Available world literature on ejection-related vertebral injuries in aviators was thoroughly surveyed and is presented as an annotated bibliography in Appendix A. Basic findings of some of the principal investigators into vertebral injury are summarized. Parameters associated with the pilot, aircraft, and ejection-seat system are evaluated in the light of their trends and relative significance in contributing to ejection-caused vertebral injury. These studies led to the development of a proposed research design to determine the dynamic strength of isolated vertebrae. Preliminary research objectives are outlined. The experimental procedure and analysis techniques are set forth. A plan for sequencing and integrating the research operations is diagramed. (Author)

AD-615 452 Div. 01/2, 09/7, 23/5
CFSTI Prices: HC$1.00 MF$0.50

Melpar, Inc., Falls Church, Va.
SIMULATION OF HELICOPTER AND V/STOL AIRCRAFT. VOLUME V. SUMMARY OF FINAL RESULTS.
Summary rept. for Sep 63-Dec 64,
by Ruth L. Faith. Dec 64, 17p
Contract N61339 1205
NAVTRADEVCEN 1205-5

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.
See also AD-611 412.

Descriptors: (*Helicopters, Simulation), (*Helicopter rotors, Simulation), (*Vertical take-off planes, Simulation), (*Short take-off planes, Simulation), Motion, Flight simulators, Programming (Computers), Mathematical models, Analog computers, Tilt wings, Airplane landings, Training devices, Naval training, Aerodynamic characteristics, Differntial equations.

Summary of the results, conclusions, and recommendations which were derived from a study program designed to develop the equations of motion of helicopter and V/STOL aircraft in a form suitable for simulation using either an analog or a digital computer. (Author)

AD-615 464 Div. 01/9
CFSTI Prices: HC$2.00 MF$0.50

Bell Helicopter Co., Fort Worth, Tex.
EFFECT OF EROSION RESISTANT BOOTS ON UH-1B/D TAIL ROTOR BLADES.
Final rept. for 18 Dec 64-12 Feb 65,
by Frank B. Burpo and Ernest C. Darlington.
May 65, 43p Rept. no. 299-099-276
Contract DA44 177AMC252T
Task 1P121401A14176
TRECOM TR-65-22

Unclassified report

Descriptors: (*Tail helicopter rotors, Protective coverings), (*Loading (Mechanics), Tail helicopter rotors), (*Protective coverings, Erosion), Isocyanate plastics, Fatigue (Mechanics), Operation, Stability, Flight testing.

The report presents the results of a flight test program conducted to evaluate erosion boots installed on the outboard 18 inches of the UH-1 helicopter tail rotor

blades. The report is not concerned with the erosion resistant qualities of the boot, but with the effect of the boot installation on the balance, operation, and fatigue life of the UH-1B/D tail rotor dynamic components. Loads as measured during flight tests of the tail rotor with the boots installed are compared to loads measured using a standard tail rotor. In both the balanced and unbalanced conditions no detrimental effects were encountered. The oscillatory loads recorded in either condition would not cause fatigue damage and no problems in operation were obtained with the boots installed. (Author)

AD-615 471 Div. 09/6, 09/5
CFSTI Prices: HC$4.00 MF$0.75

General Dynamics/Convair, San Diego, Calif.
THE EFFECTS OF ACTIVE COOLING ON THE AERODYNAMIC AND AEROTHERMODYNAMIC CHARACTERISTICS OF SLENDER BODIES OF REVOLUTION.
Final rept.,
by B. M. Leadon, Jan. Rosciszewski, W. H. Gallaher, W. R. Holst, and W. V. Carter. Nov 64, 102p
Rept. no. GDA-DBE64-060
Contract AF33 657 11679, Proj. 1366, Task 136607
FDL TR-64-187
Unclassified report

Descriptors: (*Aerodynamic characteristics, Slender bodies), (*Slender bodies, Aerodynamic characteristics), Thermodynamics, Cooling, Boundary layer, Blunt bodies, Fluid flow, Velocity, Partial differential equations, Differential equations, Integration, Numerical analysis, Enthalpy, Equations.

A new self consistent method has been developed for calculation of boundary layer with mass injection. The system of partial differential equations is reduced to a system of ordinary differential equations by integration over different strips. The velocity and enthalpy profiles are assumed to be expressed by series of error functions. A method of calculating the initial velocity and enthalpy profiles, based on an analysis of singularity, is presented herein. The calculation of the initial profiles is reduced to the solution of a system of transcendential equations. The initial derivatives are calculated from linearlized equations near the singular points and provide a smooth start of integration of the downstream equations. The present method was applied to the cases of a sharp edged body and a blunt body. In addition to the velocity and enthalpy profiles, the pressure distribution and shock layer thickness can be calculated from generalized Newtonian expressions developed as a part of this effort. (Author)

AD-615 483 Div. 33/1
CFSTI Prices: HC$6.00 MF$1.50

Southern California Labs., Stanford Research Inst., South Pasadena.
METHODOLOGY AND CRITERIA FOR NATIONAL AIRPORT PLANNING.
Final rept.,
by James E. Gorham. Sep 64, 267p
Contract FAA WA4295, Proj. ISU4431
Unclassified report

Descriptors: (*Airports, Management planning), Air traffic control systems, Cargo, United States Government, United States.

The purposes of this research were to (1) analyze the federal interest and responsibilities in airport planning, (2) determine the objectives that FAA should serve in formulating the National Airport Plan, (3) develop a generally applicable methodology for determining the airport requirements of particular communities and areas, and (4) recommend an improved methodology and criteria for the formulation of the National Airport Plan and for establishing priorities in federal financial aid. (Author)

AD-615 506 Div. 09/6, 22/4
CFSTI Prices: HC$1.00 MF$0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
MEASUREMENT OF BASE PRESSURE IN FREE FLIGHT,
by G. I. Mishin. Mar 65, 9p RSIC-396
TT 65-62292
Unclassified report

Trans. of Akademiya Nauk SSSR. Izvestiya. Mekhanika i Mashinostroenie, n6 p116-8 1963.

Descriptors: (*Base flow, Pressure), (*Cylindrical bodies, Free flight trajectories), Angle of attack, Least squares method.

The dependency of basepressure on Mach number M in cylindrical bodies with hemispherical ends, in the range of M numbers 1.32 to 2.91 and Reynolds numbers (changing proportionately to the velocity) from 900,000 to 2,000,000, was investigated on a modern ballistic projectile. Tests were performed by a method in which the deflection of the upper diaphragm was measured. This diaphragm was in the bottom of the projectile and covered a small chamber which was filled with air under atmospheric pressure and having the same temperature as that of the surrounding medium.

AD-615 528 Div. 33/1, 13/4
CFSTI Prices: HC$7.15 MF$2.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CONSTRUCTION OF AIRPORTS,
by A. A. Gerberg and A. S. Osipov. 9 Apr 65, 412p
FTD-TT-64-1273
TT 65-62295
Unclassified report

Unedited rough draft trans. of mono. Stroitelstvo Aerodromov, Moscow, 1962, 331p.

Descriptors: (*Landing field, Construction), (*Airports, Construction), Earth handling equipment, Runways, Pavements, Landing mats, Concrete, Reinforced concrete, Asphalt, Drainage.

The book presents the principles of organizing airport construction. It describes preparatory, earth-moving and agricultural operations and shows the construction of the water drainage network. An extensive description is given of the types of airport pavements and of the methods of constructing them. Recommendations, based on study of advanced experience of airfield construction organizations, are given about adapting the most effective methods for executing the work with maximum utilization of mechanization facilities.

AD-615 573 Div. 09/7
CFSTI Prices: HC$3.00 MF$0.50

Clemson Univ., S. C. Engineering Experiment Station.
SPLITTER EFFECT IN CONICAL DIFFUSERS. PART I: EXPERIMENTAL PHASE INCOMPRESSIBLE FLOW,
by Tah-teh Yang. Mar 65, 51p
Bulletin no. Bull-103

Contract DA31 124AROD148, Projs. 200 1450 1B33G, 4390E
AROD 4390:1

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Diffusers, Performance (Engineering)), (*Airfoils, Diffusers), Incompressible flow, Turbulence, Boundarylayer, Conical bodies, Separation, Nozzles, Pressure, Reynolds number, Graphics.

The effects of a ring-airfoil used as a splitter in a conical diffuser were critically examined. The influence of a ring-airfoil on (a) turbulence intensity and boundary layer profile at the diffuser inlet, (b) velocity distributions across the diffuser at stations along the main flow direction, (c) the growth of boundary layer and the velocity gradient at the diffuser wall and (d) the pressure field insidethe diffuser, are presented and discussed. The conclusions of this investigation are: (1) The diffuser performance improvement was attributed to the induced velocity around the airfoil, which modified the pressure field inside the diffuser. (2) The diffuser inlet velocity profile and turbulence intensity were very secondary effects. The experimental results were summarized in a partial performance map, which can be used as a designer's guide. The map shows that diffuser pressure recovery efficiency can be increased from 55% to 72%, and improvement of 31% by placing a thin, ring-airfoil in the diffuser as a splitter. (Author)

AD-615 597 Div. 09/5
CFSTI Prices: HC$3.00 MF$0.75

Stanford Univ., Calif.
STUDY OF THE FLOW OF A RADIATING GAS BY A DIFFERENTIAL APPROXIMATION.
Doctoral thesis,
by Ping Cheng. Jan 65, 108p
Contract AF49 638 1280

Unclassified report

Descriptors: (*Gas flow, Transport properties), (*Differential equations, Gas flow), Integral equations, Special functions (Mathematical), Thermal radiation, Aerodynamic characteristics.

AD-615 601 Div. 09/7
CFSTI Prices: HC$3.00 MF$0.75

General Electric Research Lab., Schenectady, N. Y.
ROUGHNESS, BLUNTNESS, AND ANGLE OF ATTACK EFFECTS ON HYPERSONIC BOUNDARY LAYER TRANSITION,
by H. T. Nagamatsu, B. C. Graber, and R. E. Sheer, Jr. Nov 64, 55p
Rept. no. 64-RL-(3829 C)

Unclassified report

Descriptors: (*Boundary layer transition, Conical bodies), (*Conical bodies, Boundary layer transition), Laminar boundary layer, Blunt bodies, Aerodynamic configurations, Hypersonic flow, Heat transfer, Stagnation point, Angle of attack, Turbulence, Shock tunnels, Reynolds numbers, Surface properties, Friction, Schlieren photography.

An investigation was conducted in a hypersonic shock tunnel to study the laminar boundary layer transition on a highly cooled 10-degree cone of 4-foot length over the Mach number range of 8.5 to 10.5 with a stagnation temperature of 1400K. The effects on transition of tip surface roughness, tip bluntness, and ±2-degree angle of attack were investigated. With fast response thin film surface heat transfer gauges, it was possible to detect the passage of turbulent bursts that appeared at the beginning of transition. It was found that the surface roughness greatly promoted transition in the proper Reynolds number range. The Reynolds number for the beginning and end of transition at the 8.5 Mach number location were 3,800,000 to 9,600,000 and 2,200,000 to 4,200,000 for the smooth sharp tip and rough sharp tip, respectively. The local skin friction data agreed with the heat transfer data through Reynolds analogy. The tip bluntness data showed a strong delay in the beginning of transition for a cone base to tip diameter ratio of 20, approximately a 35% increase in Reynolds number over that of the smooth sharp tip case. The angle of attack data indicated the cross flow to have a strong influence on transition by promoting it on the sheltered side of the cone and delaying it on the windward side. (Author)

AD-615 608 Div. 09/5
CFSTI Prices: HC$2.00 MF$0.50

Polytechnic Inst. of Brooklyn, N. Y.
COMPRESSIBLE TURBULENT BOUNDARY LAYER WITH ARBITRARY PRESSURE GRADIENT AND HEAT TRANSFER,
Technical rept.,
by Philip K. Sasman and Robert J. Cresci. Apr 65, 36p
Contract AF33 657 8286, Proj. 7065, Task 706505
ARL 65-65

Unclassified report

Descriptors: (*Turbulent boundary layer, Compressible flow), Pressure, Heat transfer, Momentum, Integral equations, Differential equations, Simultaneous equations.

The compressible turbulent boundary layer is expressed in terms of the momentum integral and moment of momentum integral equations for arbitrary pressure gradient. Upon simplification of this equation set with a Mager type transformation, the two coupled differential equations are solved simultaneously to provide boundary layer momentum thickness, displacement thickness, skin friction coefficient and related quantities as a function of the body surface coordinate. The analysis includes surface heat-transfer effects. Results of the analysis are presented for adiabatic, non-adiabatic, two-dimensional and axisymmetric flow fields in a Mach number range between 2 and 8. Flows with adverse pressure gradients are also examined. The present analysis is compared with available experimental and theoretical results. The analysis is found to yield satisfactory results for flows with and without heat transfer. In addition, for flows in the presence of large adverse pressure gradients in which the boundary layer is known to be well-behaved, spurious separation is not indicated; instead, rather good agreement with available experimental data is observed. (Author)

AD-615 654 Div. 01/3
CFSTI Prices: HC$3.00 MF$0.75

Columbia Univ., New York.
THE STRUCTURAL RELIABILITY OF AIRFRAMES,
by A. M. Freudenthal and A. O. Payne. Dec 64, 94p
Contract AF33 616 7042, Proj. 2 8 7351,
Task 735106
ML TR-64-401

Unclassified report

Descriptors: (*Airframes, Failure (Mechanics), (*Failure (Mechanics), Airframes), Reliability,

Structural parts, Aerodynamic loading, Crust loads, Thunderstorms, Turbulence, Strength, Mathematical analysis, Fatigue (Mechanics), Transport planes, Commercial planes, Bombers, Fighters.

The theory of reliability estimation developed in previous reports (WADD TR61-53, ML-TDR-64-300) has been applied to three types of aircraft, a civilian transport, a heavy bomber and a fighter designed by current procedures, for which operational records, multiple structural tests and records of service experience are available. Failure rates for critical ultimate load conditions have been evaluated on the basis of data obtained from various sources and compared with service experience. Lives associated with equal risk of ultimate load failure and fatigue failure (or initial structural fatigue damage) have also been computed. The obtained numerical values which reflect current design practices can serve as the basis for a rational comparative reliability analysis of new designs involving new materials and different design criteria and missions spectra and profiles. (Author)

02. Agriculture

No entries

03. Astronomy and Astrophysics

AD-615 205 Div. 02/1

System Development Corp., Santa Monica, Calif.
EXISTENCE OF PERIODIC ORBITS OF THE SECOND KIND IN THE RESTRICTED PROBLEM OF THREE BODIES,
by R. B. Barrar. 20 Nov 64, 3p
Rept. no. SP-1488/003/00
Unclassified report

Revision of manuscript submitted 1 Jul 64
Pub. in The Astronomical Journal v70 n1 p3-4 Feb 1965
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*N-body problem, Celestial mechanics), (*Celestial mechanics, N-body problem), Dynamics.

The existence of Poincaré's periodic orbits of the second kind in the restricted problem of three bodies is shown using Delaunay variables. (Author)

AD-615 260 Div. 02/1
CFSTI Prices: HC$2.00 MF$0.50

Boeing Scientific Research Labs., Seattle, Wash.
LUMINESCENCE OF THE LUNAR SURFACE,
by Zdenek Kopal. Feb 65, 41p
Mathematical note no. MN-391, D1-82-0410
Unclassified report

Also available from the author.

Descriptors: (*Moon, Luminescence), (*Luminescence, Moon), Solar radiation, Solar disturbances, Ultraviolet radiation, X rays, Intensity, Lunar eclipses, Surface properties.

The lunar surface is continuously bombarded by high-energy UV and X-ray quanta as well as by the corpuscular radiation from the Sun. There are indications that solar radiation gives rise to luminescent emission which can penetrate the atmosphere and become observable on the ground. Indications that emission of this kind may constitute indeed an appreciable contribution to total light of the Moon have been coming forth from many experienced observers. The main purpose of the article is to present the current state-of-the art on lunar luminescence.

AD-615 278 Div. 02/1
CFSTI Prices: HC$4.00 MF$1.00

Boeing Scientific Research Labs., Seattle, Wash.
MOTION OF THE MOON AND DYNAMICS OF THE EARTH-MOON SYSTEM,
by Zdenek Kopal. Mar 65, 132p
Mathematical note no. MN-402, D1-82-0425
Unclassified report

Also available from the author.

Descriptors: (*Moon, Celestial mechanics), (*Earth, Moon), (*Celestial mechanics, Moon), Motion, Rotation, Lunar eclipses, Center of gravity, Astronautics.

Contents: Basic facts: Distance, size, and mass; The motion of the moon in space; Rotation of the moon; optical librations; Motion of the moon about its center of gravity; physical librations; Photometric consequences of the moon's motion: Phases and eclipses; Dynamics of the earth-moon system.

AD-615 324 Div. 08/3, 02/1, 08/2, 08/7, 16/8, 25/1, 25/6, 25/7, 30/2, 32/11
CFSTI Prices: HC$7.40 MF$2.25

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
QUARTERLY PROGRESS REPORT NO. 77. GENERAL PHYSICS, PLASMA DYNAMICS AND COMMUNICATION SCIENCES AND ENGINEERING,
by H. J. Zimmermann and G. G. Harvey. 15 Apr 65, 438p
Contracts DA36 039AMC03200E, AT30 1 1842
Unclassified report

See also AD-612 062.

Descriptors: (*Electronics, Scientific research), (*Physics, Scientific research), (*Plasma physics, Scientific research), (*Communication theory, Scientific research), Molecular beams, Microwave spectroscopy, Radio astronomy, Infrared spectroscopy, Ultrasonic radiation, Geophysics, Gravity, Magnetic resonance, Acoustics, Magnetohydrodynamics, Energy conversion, Machine translation, Speech, Biophysics, Nervous system, Physiology, Neurology, Networks.

Progress in the following areas is summarized: molecular beams, microwave spectroscopy, radio astronomy, optical and infrared spectroscopy, ultrasonic properties of solids, geophysics, gravitation research, magnetic resonance, physical acoustics, plasma physics, plasma electronics, plasma magnetohydrodynamics and energy conversion, statistical communication theory, processing and transmission of information, speech communication, mechanical translation, cognitive information processing, communications biophysics, neurophysiology, neurology, network synthesis.

AD-615 367 Div. 02/1
CFSTI Prices: HC$3.00 MF$0.75

Manchester Univ. (England) Dept. of Astronomy.
FORMULAE AND AUXILIARY TABLES FOR THE REDUCTION OF LUNAR OBSERVATIONS,
by K. Graff. Nov 64, 90p
Contract AF61 052 524
AFCRL 65-328; TT 65-62282
Unclassified report

Formeln und Hülsfstafeln zur Reduktion von Mondbeobachtungen und Mondphotographieen, trans. of Astronomisches Recheninstitut, Berlin. Veröffentlichungen (Germany) n14 1901.

Descriptors: (*Moon, Exploration), Tables, Surface area, Illumination, Astronomical data.

Contents: Preliminary calculations; Effect of the rotation and revolution of the moon upon the position of its axis and equator relative to the earth; Determinations of positions on the lunar surface; Illumination ratios of the moon; Determination of selenographic dimensions.

AD-615 403 Div. 02/1, 02/7, 25/7
CFSTI Prices: HC$1.00 MF$0.50

Liege Univ. (Belgium).
RESEARCH ON RELATIONS BETWEEN COMETARY, SOLAR AND UPPER ATMOSPHERIC PROCESSES.
Annual summary rept. no. 3, 1 Apr 64-31 Mar 65,
by P. Swings. 31 Mar 65, 23p
Contract AF61 052 587
AFCRL 65-304 Unclassified report

Descriptors: (*Comets, Ultraviolet spectroscopy), (*Solar radiation, Ultraviolet radiation), (*Upper atmosphere, Molecular properties), (*Molecular spectroscopy, Astronomy), Photomulpliers, Space probes, Satellites (Artificial), Stars, Aurorae, Plasma medium, Hydrogen, Deuterium, Carbon, Photochemistry, Geophysics.

Laboratory work was carried on: the time resolution of spectra; the spectra of several molecules of astronomical interest; various instruments; the study of photomultipliers. The physical mechanisms in comets were further discussed. Other programs of cometary and solar investigations were started. Investigations related to space experiments are mainly concerned with the far ultraviolet spectra of stars, comets and aurorae, and with artificial comets. Preparations are being made for a search for faint comets at the 1965 airborne solar eclipse expedition. (Author)

AD-615 487 Div. 02/1
CFSTI Prices: HC$1.00 MF$0.50

Colorado Univ., Boulder. Dept. of Astro-Geophysics.
PHYSICS OF THE SOLAR CORONA.
Final rept. for 1 May 64-31 Mar 65,
by Donald E. Billings. 31 Mar 65, 3p
Grant Nonr G00059 64, Task 046 740
Unclassified report

Descriptors: (*Solar corona, Physical properties), Solar flares, Solar spectrum, Magnetic fields.

A summary is given of work on: (1) a book on the solar corona; (2) the development of a theory for the Moreton wave eminating from solar flares; (3) a study of the physics of coronal condensations through the intensity and profiles of the two coronal yellow lines and the coronal continuum; (4) a study, from Climax and Sacramento Peak prominence films, of the stability of quiescent prominences.

AD-615 611 Div. 02/1, 02/7
CFSTI Prices: HC$5.00 MF$1.00

San Andres Univ., La Paz (Bolivia).
TIME VARIATIONS IN COSMIC RAYS AND RADIOSONDE MEASUREMENTS.
Final technical rept.,
by Ismael Escobar. Aug 64, 153p Rept. no. 27
Grant AF AFOSR63 319
Unclassified report

Descriptors: (*Cosmic rays, Diurnal variations), (*Solar flares, Cosmic rays), (*Radiosondes, Data), Ozone, Measurement, South America.

Analysis on data registered at Chacaltaya were performed, comparing results in some special cases with data from other stations. These analyses involve calculation of harmonic parameters and correlations of Cosmic Ray events with solar activity in the range of Forbush decreases and diurnal variations. (Author)

AD-615 686 Div. 02/1, 30/4

Florida Univ., Gainesville. Radio Observatory.
UNIVERSITY OF FLORIDA RADIO OBSERVATORY,
by Alex G. Smith. 1964, 3p
Grant DA AROD31 124G560
AROD 2083:28

Unclassified report

Pub. in Astronomical Journal v69 n9 p656-8
Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Astronomical observatories, Universities), Yagiantennas, Radio astronomy, Jupiter, Scientific personnel, Scientific research, Florida.

04. Atmospheric Sciences

AD-615 201 Div. 02/7, 25/4
CFSTI Prices: HC$3.00 MF$0.75

Lockheed Missiles and Space Co., Sunnyvale, Calif.
TRANSMISSION THROUGH EXTREME MODEL ATMOSPHERES,
by L. L. List and G. E. Oppel. 15 Sep 64, 88p
LMSC-A701650
Contract AF04 647 787

Unclassified report

Descriptors: (*Infrared radiation, Wave transmission), (*Atmosphere, Wave transmission), Atmosphere models, Tropical regions, Artic regions, Periodic variations, Heat transfer, Haze, Absorption, Carbon dioxide, Water vapor.

The transmission of infrared energy in the 2.5- to 3.1-micron spectral region has been calculated for four model atmospheres representing average and extreme latitudinal and seasonal variations. Transmission values are shown for slant paths outward through the earth's atmosphere as a function of zenith angle and starting altitude of the ray path. Values have been calculated, using the Elsasser and Goody absorption-band models, for absorption by carbon dioxide and water vapor, respectively. The spectral resolution is approximately 0.006 micron. From altitudes above 10 km., maximum transmission is obtained through the tropical model atmosphere and minimum transmission is obtained from the artic summer model. From altitudes below 10 km., the extreme atmospheres are the artic winter model (maximum transmission) and the tropical model (minimum transmission). (Author)

AD-615 275 Div. 02/7
CFSTI Prices: HC$1.00 MF$0.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
POSSIBLE PRECIPITATION CHANGES RESULTING FROM THE PROPOSED RAMPART DAM RESERVOIR,
by David M. Henry. Mar 65, 23p
Technical rept. no. TR-147
Task 1V014501B52A31

Unclassified report

Descriptors: (*Micrometeorology, Alaska), (*Atmospheric precipitation, Alaska), Dams, Evapotranspiration, Humidity, Climatology, Hydrology, Weather forecasting.

Results of computations are presented which show the changes in monthly precipitation that may occur in the Yukon basin, Alaska, after a large body of water is formed in the valley. Two methods were used. In the first method the changes in precipitation were computed by estimating the changes in precipitable water in the air caused by the new water source. The changes in precipitation are limited to the basin and are uniformly distributed downwind from the reservoir. The second method assumes that the percent change of specific humidity as a result of the reservoir is proportional to the precipitation change. Results of both methods indicate that an important increase in precipitation will occur in the southwestern quadrant of the basin during the fall months. The study also shows a small negative change in precipitation throughout the basin in late spring and early summer. This decrease as predicted by the first method is greater than that obtained by the second method. (Author)

AD-615 276 Div. 02/7
CFSTI Prices: HC$2.00 MF$0.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
SUMMARY OF WHITEOUT STUDIES,
by J. R. Hicks. Mar 65, 35p
Technical rept. no. TR-158
Task 1V014501B52A31

Unclassified report

Descriptors: (*Fog, Visibility), (*Cloud cover, Visibility), (*Visibility, Meteorological phenomena), Atmosphere, Arctic Regions, Artificial precipitation, Solidified gases, Carbon dioxide, Silver compounds, Iodide, Ice, Nucleation, Phenols, Sounding rockets, Meteorological balloons, Optics.

Previous whiteout work done by CRREL from 1954 to 1962 is outlined and field studies by CRREL in 1963, including instrumentation, seeding materials, and test procedures are discussed. The 1963 experiments were designed to test the feasibility of using recently developed rockets (cold-propellant and solid-fuel types), continue the investigation of tethered balloon techniques, and field test the organic compound phloroglucinol, which was recently found to be an effective ice-nucleating reagent in the laboratory. A ground-based system for fog dispersal is feasible. Of the many systems tested, the CRICKET is the most promising. It can be moved easily to any suitable area, penetrate fog or clouds to heights of about 4000 ft, and is less expensive to buy and operate. It was concluded that better tracking and observing techniques are needed to determine if the seeding is effective. Monitoring a test from the ground in a dense low fog is difficult because (1) observers easily get lost, and (2) variable air movements make uncertain the drift of the seeded area. (Author)

AD-615 405 Div. 02/7, 08/6, 12/1, 30/5
CFSTI Prices: HC$1.00 MF$0.50

Land-Air, Inc., Point Mugu, Calif.
ON A METHOD OF INVESTIGATING THE IONOSPHERE WITH THE AID OF AN ARTIFICIAL SATELLITE OF THE EARTH.
Language Trans. Series,
by Ya L. Alpert. 24 Apr 61, 23p Rept. no. LTS-5
Contract N123 61756 19425A PMR
TT 61-19928

Unclassified report

O Metode Issledovaniya Ionosfery s Pomoshch'yu Iskustvennogo Sputnika Zemli, trans. of Uspekhi Fizicheskikh Nauk (USSR) v64 n1 p3-14 1958
Other trans. are available from LC or SLA as TT-59-12051, and TT-59-20277, and as PB-141 482T.

Descriptors: (*Ionosphere, Meteorological satellites), (*Meteorological satellites, Ionosphere), Radio signals, Satellites (Artificial), Doppler effect, Electron density, Ionospheric disturbances, Ionization.

A method is considered for investigating the ionosphere with the aid of artificial satellites of the earth which makes it possible to obtain data on the parameters of the ionosphere. These data are of great importance for the interpretation of the structure of the ionosphere and for the determination of the causes for various phenomena observed in the ionosphere. Equivalent data cannot be obtained at the present time by any other known means than those suggested here.

AD-615 423 Div. 02/7, 15/1, 25/4
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.

COMPUTATIONAL SOLUTION OF RADIATIVE TRANSFER PROBLEMS IN CLOUD PHYSICS,
by R. Bellman, H. Kagiwada, R. Kalaba, and S. Ueno. May 65, 12p Rept. no. P-3125

Unclassified report

Descriptors: (*Clouds, Light), (*Light, Scattering), (*Wave transmission, Atmosphere), Integral equations, Differential equations, Numerical methods and procedures, Propagation, Polarization, Optical properties, Fourier analysis.

Multiple scattering of light in clouds is dealt with. Highly anisotropic transfer problems are treated as one step toward the determination of the structure and dynamics of clouds based on experimental measurements. Radiation fields for isotropic and anisotropic scattering are determined.

AD-615 426 Div. 02/7, 02/4, 30/5
CFSTI Prices: HC$3.00 MF$0.75

Weather Services, Inc., Boston, Mass.
TECHNIQUES OF DATA REDUCTION FOR GROUND BASED STEREO PHOTOGRAPHS AND AIRCRAFT RECORDED ATMOSPHERIC VARIABLES.
Final rept. for 14 Dec 59-31 Dec 64,
by Carol J. Greenough. 31 Mar 65, 92p
Contract AF19 604 6616, Proj. 8620,
Tasks 862002, 862001
AFCRL 65-262

Unclassified report

Descriptors: (*Cumulus clouds, Photogrammetry), (*Atmospheric electricity, Meteorological parameters), Dynamics, Storms, Clouds, Statistical analysis, Stereoscopic photography, Electric fields.

Data was reduced and analyzed to support studies on the growth and dynamics of cumulus clouds. The photographs and record charts evaluated were supplied by the Cloud Physics Branch, Meteorology Laboratory, Air Force Cambridge Research Laboratory. Measurement techniques were introduced and used to obtain a sequence of measurements for cumulus clouds from stereo ground based photographs. Trajectories, dimensions, and velocities of cloud tufts were obtained from computer processing and graphed. Atmospheric variables and electric fields patterns were determined from oscillograph records of instruments aboard aircraft. The resulting data has been and will be used by Air Force personnel for further analysis and study. (Author)

AD-615 444 Div. 02/7, 25/4, 30/5
CFSTI Prices: HC$3.00 MF$0.75

Electro-Optical Systems, Inc., Pasadena, Calif.
LASER METEOROLOGICAL RADAR STUDY.
Final rept.,
by Ellis D. Harris, Leonard J. Nugent, and Glenn A. Cato. Jan 65, 93p Rept. no. 5990
Contract AF19 628 4309, Proj. 0000 39
AFCRL 65-177

Unclassified report

Descriptors: (*Lasers, Meteorological radar), (*Meteorological radar, Lasers), Feasibility studies, Measurement, Meteorological parameters, Optical properties, Doppler effect.

Theoretical studies have been conducted to determine the feasibility of employing optical radar techniques for the remote measurement of atmospheric meteorological parameters. These studies show the feasibility of laser radar measurements of atmospheric density, wind velocity, and concentration of water vapor and other variable constituents. Methods of temperature measurement have been identified and are feasible with a foreseeable improvement in the state of the art. An experiment is proposed to characterize atmospheric aerosol size distribution by means of polychromatic laser illumination. (Author)

AD-615 455 Div. 02/7

Centre National de la Recherche Scientifique, Verrieres-Le-Buisson (France). Service d'Aeronomie.
EXPERIMENTAL EVIDENCE FOR A SUDDEN HEATING OF IONOSPHERE IN THE AURORAL ZONE, AND ITS CORRELATION WITH OTHER GEOPHYSICAL DATA.
Final rept.,
by J. E. Blamont and M. L. Chanin Lory. 1964,
9p Rept. no. MLC-MO/13
Contract AF61 052 527
AFCRL 65-284

Unclassified report

Available only for reference use at DDC Field Services. Copy is not available for public sale.

Descriptors: (*Ionosphere, Heating), Aurorae, Geophysics, Experimental data, Ionospheric disturbances, Canada, Atmospheric sounding.

AD-615 456 Div. 30/3, 02/7
CFSTI Prices: HC$3.00 MF$0.75

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
STUDIES AND EXPERIMENTAL INVESTIGATION OF SPACE CHARGE MEASUREMENT EQUIPMENT.
Final rept. for 1 Sep 62-28 Feb 65,
by Robert A. Fluegge and Roland J. Pilie.
28 Feb 65, 94p Rept. no. CAL-RM-1751-P-1
Contract AF19 628 1680, Proj. 8620, Task 862001
AFCRL 65-209

Unclassified report

Descriptors: (*Raindrops, Static electricity), (*Static electricity, Raindrops), Atmospheric precipitation, Meteorological instruments, Meteorological parameters, Airborne, Electrostatics, Clouds, Meters, Wiring diagrams, Design.

Airborne instrumentation was developed to measure the electrical charge on individual raindrops; simultaneous drop size measurement can be correlated to each charge determination. The equipment is sensitive to charges ranging from ±1.5 x 10 to the 6th power to ± 2.5 x 10 to the 9th power electronic charges on raindrops having diameters larger than 250 microns. A self calibrating, servo-controlled disdrometer is incorporated to insure that size and charge determinations are performed using drops that have not approached any solid surface. (Author)

AD-615 473 Div. 02/7
CFSTI Prices: HC$6.00 MF$1.25

American Meteorological Society, Boston, Mass.
ALPHABETICAL LIST OF SUBJECT HEADINGS WITH CORRESPONDING UNIVERSAL DECIMAL CLASSIFICATION NUMBERS FOR METEOROLOGY (551.5) AND RELATED SUBJECTS (A THROUGH L). VOLUME I.
Edition not. 2,
by Andre Vandenplas, Winifred Schraitle, and C. E. P. Brooks. Oct 60, 236p
Contract AF19 604 7258
PB 164 244-1

Unclassified report

Second Enlarged Edition based on v1-10 of Meteorological Abstracts and Bibliography, Jan 50-Dec 59.
Rept. prepared under sponsorship of National Science Foundation, Washington, D. C., and Air Force Cambridge Research Center, Bedford, Mass.

Descriptors: (*Meteorology, Subject headings), (*Subject headings, Meteorology), Classification.

The present edition of List of Subject Headings with Corresponding Universal Decimal Classification numbers covering the first ten volumes of Meteorological Abstracts and Bibliography, contains about 19,000 terms compared with 7,000 in the first definitive edition (for Vol. I-V, 1950-1954) and 2500 in the first Provisional edition (2 1/2 years, 1950-1952). This list is merely a compilation of headings which have been used in the first ten volumes of MAB, and is not an authoritative list of those headings which should be used. Many of these headings should not have been used at all, or are no longer meaningful because of changing concepts as to detail of and relationship between headings. Nevertheless, 80% to 90% of these terms can be considered valid for future use. The user can readily determine whether or not any term listed is reasonable, especially if considered with respect to adjacent or related terms. (Author)

AD-615 489 Div. 02/7, 02/1, 02/6
CFSTI Prices: HC$2.00 MF$0.50

Massachusetts Inst. of Tech., Cambridge.
THE REACTION OF ATMOSPHERIC OZONE TO SUDDEN SOLAR DISTURBANCE.
Final rept. for Mar 64-Feb 65,
by Hurd C. Willett and John T. Prohaska. Apr 65, 35p
Contract AF19 628 3854, Proj. 8628, Task 862806
AFCRL 65-201

Unclassified report

Descriptors: (*Ozone, Atmosphere), (*Solar disturbances, Ozone), Sunspots, Climatology, Periodic variations, Terrestrial magnetism.

The primary objective of this abortive project was the investigation of the relationship of total atmospheric ozone to variable solar activity and the changing pattern of the general circulation. During the year before the termination of the project three things were accomplished: (1) Completion of the draft of the delayed Final Report. (2) The final analysis of sunspot-ozone relationships in terms of all monthly mean station values of total ozone previous to 1960. A paper presenting the results of this preliminary analysis constitutes the greater part of this report and is abstracted in full. (3) The preparation of a large body of daily total ozone station data for the continued investigation on a day-to-day basis of the relationship of total ozone to variable solar activity and the changing pattern of the general circulation. (Author)

AD-615 492 Div. 02/7, 01/1, 30/3
CFSTI Prices: HC$2.00 MF$0.50

Basic Devices, Inc., Wellesley, Mass.
DEVELOPMENT OF AN AIRBORNE JET STREAM DETECTOR.
Final rept.,
by Robert S. Djorup. Feb 64, 35p
Contract AF19 628 1677, Proj. 6020, Task 602002
AFCRL 64-194

Unclassified report

Descriptors: (*Jet streams (Meteorology), Monitors), Airborne, Wind-direction indicators, Aircraft equipment, Electric bridges, Resistance (Electrical), Temperature, Metal films, Platinum, Cooling, Ammeters.

The basic concept employed was the determination of the differential degree of airstream cooling of two wing-tip mounted heated resistance probes connected in a modified Wheatstone bridge circuit configuration. The horizontal direction to the axis of the nearest jet stream core, counter to the direction of the aircraft, is indicated by the sense of that wing-tip probe whose lower resistance is brought about by an increase in relative wind gradient. The system was packaged for aircraft installation and consists of three elements; the wing-tip mounted probe pair and the cockpit housed control and display unit. The report describes aspects of design, development, and laboratory tests. (Author)

AD-615 494 Div. 02/7
CFSTI Prices: HC$6.00 MF$1.50

Marine Lab., Univ. of Miami, Coral Gables, Fla.
THE HURRICANES OF THE CARIBBEAN SEA AND ADJACENT REGIONS DURING THE EIGHTEENTH CENTURY.
Final rept. for 1 Jul 64-30 Jun 65,
by Jose Carlos Millas. Jun 65, 277p
Rept. no. 8175-1, ML-65123
Contract Cwb10938

Unclassified report

Descriptors: (*Tropical cyclones, History), Caribbean Sea, West Indies, Meteorological parameters.

The report is a historical investigation on the hurricanes that existed in the Caribbean Sea and adjacent regions in the past. It corresponds to the eighteenth century.

AD-615 527 Div. 02/7
CFSTI Prices: HC$3.00 MF$0.75

Munich Univ. (West Germany). Meteorologisches Institut.
INVESTIGATION OF THE INFRARED EMISSION SPECTRUM OF THE ATMOSPHERE AND EARTH.
Annual summary scientific rept.,
by Hans-Jurgen Bolle, Gunter Kuers, Heinrich Quenzel, Werner Volker, and Adalbert Leupolt. 25 Feb 65, 86p
Contract AF61 052 778
AFCRL 65-268

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Earth, Infrared spectroscopy), (*Atmosphere, Infrared spectroscopy), (*Infrared spectroscopy, Earth), Solar radiation, Radiometers, Scattering.

Comparisons between sky emission measurements in the window region of 4.7 microns, and transmission measurements over a path length of about 35o m with emissivities and transmissivities calculated from the transmission data of PLASS, STULL, and WYATT indicate that the theoretical data have to be corrected by a factor of o.2 - o.4. Scattered solar radiation could not be indicated in the sky emission spectrum at 4.7 microns by a comparison of day- and nighttime measurements. Extinction coefficients were derived from interference filter actinograph measurements, and were used in an investigation about the continuum absorption in the near infrared windows. Further developments in the construction of a helicopter radiometer for measurements of the scattered solar radiation are reported. (Author)

AD-615 539 Div. 02/7, 02/9
CFSTI Prices: HC$1.00 MF$0.50

Texas A and M Univ., College Station. Dept. of Oceanography and Meteorology.
THE GULF OF MEXICO AFTER HURRICANE HILDA (PRELIMINARY RESULTS),
by Dale F. Leipper. Apr 65, 22p Ref-65-12T
Contract Nonr211904, Proj. 286
Unclassified report

Descriptors: (*Tropical cyclones, Mexico Gulf), (*Mexico Gulf, Tropical cyclones), Hurricane tracking, Wind, Bathythermographic data, Hydrographic surveying, Temperature, Ocean waves, Oceanographic data, Meteorological phenomena, Marine geophysics, Marine meteorology, Maps.

HurricaneHILDA crossed the Gulf of Mexico in the period September 30 to October 4, 1964, developing to a very severe hurricane in the central Gulf. Sea temperature data available prior to the storm indicated what is probably a typical late summer situation with some surface temperatures running above 30C. Beginning on October 5, a seven-day cruise was conducted over the area where hurricane winds, had been observed. Using the Bureau of Commercial Fisheries vessel GUS III, four crossings of the hurricane path were made, one where the maximum 150 mph winds were observed, one south of that where the winds had first reached 120, one north where they had decreased to 120 and one in shallow water (40 fathoms), where prior data had been collected by the U. S. Fish and Wildlife Service from their Galveston Biological Laboratory. Bathythermograms were taken regularly to depths of 270 meters and hydrographic casts to 125 meters. All four sections of observations indicated similar patterns of upwelling. During the passage of the hurricane it appears that sea surface temperatures over an area of some 70 by 220 miles decreased by more than 5C, and that a cyclonic ocean current system was established around this area. The data collected on the GUS cruise appear to be the first systematic oceanographic observations available in such a situation. (Author)

AD-615 571 Div. 02/7
CFSTI Prices: HC$3.00 MF$0.75

Atmospheric Research Lab., Univ. of Oklahoma Research Inst., Norman.
ATMOSPHERIC STRUCTURE AND CIRCULATION TO 200 KM IN TERMS OF DENSITY.
Final rept. for 1 Jun 62-28 Feb 65,
by V. S. Whitehead, A. M. Lencer, D. R. Harper, and W. J. Saucier. Mar 65, 86p Rept. no. ARL-1357-5
Contract AF19 628 489, Proj. 8624, Task 862402
AFCRL 65-242
Unclassified report

Descriptors: (*Atmospheric motion, Density), Hydrostatics, Diurnal variations, Atmospheric sounding, Air mass analysis, Wind, Upper atmosphere, Solar radiation, Thermal radiation, Heat transfer, Mathematical models, Atmosphere models, Meteorological charts.

Synoptic charts of pressure, temperature, and density as determined by the wind field were prepared to 56 km altitude. These charts indicate that synoptic scale perturbations similar in extent to those found in the troposphere and lower stratosphere exist to at least up to that height. Mean monthly meridional cross-sections of density distribution as determined by the wind field are given to 80 km altitude. These cross sections depict well the known lower level features of the density distribution and suggest an orderly change in the mesospheric density pattern as the seasons progress. Diurnal and semidiurnal oscillations of isopycnic surfaces at 20N, 30N, and 40N for summer and for winter are given to 80 km. The amplitude of the diurnal wave appears to increase rapidly above 50 km with the phase shifting eastward with height to 80 km. Three atmospheric models are presented in which absorption of solar radiant energy and the downward conduction of heat are the only heat transfer processes. These models were intended to simulate, to some extent, the atmosphere between 90 and 200 km. Discrepancies between the three models, however, discourage their use for their intended purpose, but do suggest methods for developing improved models. (Author)

AD-615 579 Div. 02/7
CFSTI Prices: HC$2.00 MF$0.50

Texas A and M Univ., College Station. Dept. of Oceanography and Meteorology.
SOME ASSOCIATIONS OF RAINFALL IN CENTRAL AMERICA.
Master's thesis,
by Sidney Owen Barnard. May 65, 49p
Unclassified report

Descriptors: (*Rainfall, Central America), (*Central America, Rainfall), Seacoast, Pacific Ocean, Caribbean Sea, Mountains, Costa Rica, Panama, Nicaragua, Meteorological parameters, Statistical analysis, Correlation techniques, Maps.

The coefficient of association (the square of the product-moment correlation coefficient) was used to determine the relationships of year to year rainfall variations in Central America, to investigate the extent of frontal activity by studying the January rainfall in Central America, and to describe the rainfall on a meso-scale area on the Pacific coast of Costa Rica and Panama. Generally, high associations are limited to small geographical areas. The Pacific coast areas have higher association than do areas in the mountains or on the Caribbean coast. Associations across the isthmus are very low, with some areas having negative values. From the analysis of association it is suggested that cold fronts in January influence the rainfall as far south as southern Nicaragua but are restricted to the Caribbean area, and that frontal activity is not evident in the mountains. Association patterns in southern Costa Rica and southwestern Panama suggest that relatively small terrain features combined with the sea breeze front have great effects on the rainfall variations. (Author)

AD-615 582 Div. 02/7, 02/3
CFSTI Prices: HC$3.00 MF$0.75

Texas A and M Univ., College Station. Dept. of Oceanography and Meteorology.
AN INVESTIGATION OF THE DISTRIBUTION OF RAINFALL WITH ELEVATION FOR SELECTED STATIONS IN ECUADOR.
Master's thesis,
by Glenn B. Rumley, Jr. May 65, 73p
Unclassified report

Descriptors: (*Rainfall, Ecuador), (*Geophysics, Rainfall), Ocean currents, Mountains, Wind, Meteorological parameters, Statistical analysis.

This study is addressed to an investigation of the rainfall-elevation relationship in Ecuador. A brief review of three factors, ocean currents, mountains, and wind systems, affecting the rainfall is presented. The basic data for this study is the mean annual rainfall and the station elevation. The mean annual rainfall was calculated for all stations having four or more years of complete data. Ecuador was divided into similar rainfall zones and the characteristic rainfall pattern for each

zone is discussed. By use of cross sections, a profile of elevation and mean annual rainfall across the country from west to east is presented to depict the rainfall-elevation relationship. Finally, an attempt is made by the method of simple linear regression, to relate rainfall with elevation. This relation proved to be unsatisfactory so the orthogonal polynomial method is tried. A better relationship was obtained by this method. (Author)

AD-615 585 Div. 02/7, 08/6, 12/2
CFSTI Prices: HC$4.00 MF$0.75

New Hampshire Univ., Durham.
IONOSPHERIC STUDIES UTILIZING ARTIFICIAL EARTH SATELLITE RADIO SIGNALS.
Final rept.,
by Robert E. Houston. Feb 64, 105p
Contract AF19 604 4145, Proj. 7663, Task 76637
AFCRL 64-889

Unclassified report

Descriptors: (*Ionosphere, Radio signals), (*Satellites (Artificial), Radio signals), Ionospheric disturbances, Radio receivers, Magneto-optic effect, Doppler effect, Antenna configurations, Oscillators, Electron density, Terrestrial magnetism.

A completely phase-locked, automatically tracking, narrow-band receiving system designed specifically for use with low-power radio signals emitted by artificial earth satellites is described. Methods utilizing the Doppler-frequency shift and Faraday rotation for the study of the regular ionosphere are outlined. Also, scintillation methods and a spaced antenna configuration for the study of irregularities in the ionosphere are discussed. (Author)

AD-615 592 Div. 02/7
CFSTI Prices: HC$6.00 MF$1.50

American Meteorological Society, Boston, Mass.
ALPHABETICAL LIST OF SUBJECT HEADINGS WITH CORRESPONDING UNIVERSAL DECIMAL CLASSIFICATION NUMBERS FOR METEOROLOGY (551.5) AND RELATED SUBJECTS (M THROUGH Z). VOLUME II.
Enlarged ed. no. 2,
by Andre Vandelplas, Winifred Schraitle, and C. E. P. Brooks. Oct 60, 242p
Contract AF19 604 7258
PB 164 244-2

Unclassified report

See also AD-615 473.

Descriptors: (*Meteorology, Subject headings), (*Subject headings, Meteorology), Classification.

AD-615 697 Div. 02/7

Pennsylvania State Univ., University Park. Mineral Industries Experiment Station.
THE CRITICAL RICHARDSON NUMBER AND ITS IMPLICATIONS FOR FORECAST PROBLEMS,
by Richard Lyons, H. A. Panofsky, and Sarah Wollaston. 30 Jan 64, 11p Scientific rept. no. SR-4
Contract AF19 604 6641, Proj. 8604, Task 860401
AFCRL 65-35

Unclassified report

Revision of manuscript submitted 13 Nov 63
Pub. in Journal of Applied Meteorology v3 n2 p136-42 Apr 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Atmospheric motion, Weather forecasting), (*Weather forecasting, Atmospheric motion), Wind, Dew point, Atmospheric temperature, Meteorological data, Alabama, New York.

It is shown that, in the lowest few hundred meters, nighttime inversions tend to break down due to onset of turbulence when the Richardson number falls between 0.2 and 0.5. Since the Richardson number is statistically related to the wind speed at one to a few hundred meters, it is found that the dew-point depression in the morning, as well as visibility, is related to the wind speed above the surface. It follows, that objective forecast techniques for the dew-point depression and visibility can be improved by including the wind speed above the surface as a parameter. (Author)

AD-615 711 Div. 02/7
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
THE DIFFERENCE BETWEEN WEATHER FORECASTERS AND WEATHER ADVISORS,
by R. R. Rapp. May 65, 11p Rept. no. P-3145

Unclassified report

Paper prepared for presentation at the National Meeting of the Operations Research Society of America (27th), Boston, Mass., 6-7 May 65.

Descriptors: (*Weather forecasting, Personnel), Meteorology, Decision theory, History, United States Government, Communication systmes, Climatology, Operations research, Statistical analysis, Graphics.

It is suggested that our improved, but still imperfect, knowledge of the atmosphere can best be transmitted by creating a link between the meteorologist and the user. This link, which has been personified by the term 'weather advisor,' would combine the operational requirements of the users with the weather information of the meteorologist to produce advisories with direct application to the problem. The application of decision theory to properly stated forecasts might well produce the best advisories.

AD-615 749 Div. 02/7, 01/1, 01/4
CFSTI Prices: HC$2.00 MF$0.50

Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
1964 ROUGH RIDER SUMMARY OF PARAMETERS RECORDED, TEST INSTRUMENTATION, FLIGHT OPERATIONS AND AIRCRAFT DAMAGE.
Rept. for 28 Apr-20 Aug 64,
by Edward Miller. Apr 65, 48p ASD TR-65-1
Proj. 804A8620 603

Unclassified report

Descriptors: (*Thunderstorms, Research planes), (*Research planes, Flight testing), (*Meteorological instruments, Research planes), Flight, Damage, Air, Temperature, Fighters.

Various types of instrumentation were installed in a standard F-100F fighter aircraft. This aircraft was used to penetrate thunderstorms around Tinker AFB, Oklahoma and Patrick AFB, Florida. The data received from the test instrumentation was used to obtain liquid water temperature, free air temperature, altitude, airspeed, normal acceleration, vertical gust velocity and electric field intensity in and around thunderstorms. Lightning study equipment was also installed in wing and center line tanks mounted on the F-100F aircraft. The report briefly discusses the principle of operation and degree of accuracy of the above mentioned instrumentation. The report also covers flight operations, aircraft damage and a list of improvements suggested at this time as a result of studies of the recorded information. (Author)

05. Behavioral and Social Sciences

AD-615 198 Div. 32/3, 28 all

System Development Corp., Santa Monica, Calif.
A FACTOR ANALYTICALLY DERIVED CLASSIFICATION SYSTEM FOR PSYCHOLOGICAL REPORTS,
by Harold Borko. 14 Dec 64, 14p Rept. no. SP-1704
Unclassified report

Pub. in Perceptual and Motor Skills v20 p393-406 1965
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Reports, Classification), (*Psychology, Reports), (*Factor analysis, Classification), (*Classification, Factor analysis), Psychology, Abstracting, Word association, Analysis.

A sample of approximately 1,000 abstracts was obtained from 'Psychological Abstracts' and keypunched for computer processing. Based upon a frequency distribution of words in these abstracts, 150 tag-terms were selected. These terms were intercorrelated on the basis of their co-occurrence in documents, and the resulting matrix was factor analyzed. The factors were interpreted as representing classification categories. These were compared with, and shown to be similar to, the APA (American Psychological Assn.) classification system. The study demonstrates that it is possible to determine the basic dimensions of a collection of documents by an analysis of the words used in their abstracts. (Author)
(Presented at the American Psychological Association Convention, Sept 1964, Los Angeles)

AD-615 199 Div. 28/1, 28/5

System Development Corp., Santa Monica, Calif.
LEADERSHIP IN SMALL GROUPS: A MATHEMATICAL APPROACH,
by Arnold Binder, Burton R. Wolin, and Stanley J. Terebinski. 26 Dec 63, 10p
Rept. no. SP-1478
Unclassified report

Pub. in Journal of Experimental Psychology v69 n2 Feb 1965.
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Leadership, Mathematical models), (*Mathematical models, Leadership), Experimental data, Group dynamics, Decision making, Statistical processes, Students.

The broad purpose of this research was the investigation of the relationship between decision-making success and the likelihood of being voted 'leader' (group decision maker) of a 3-man group. Markov models, based on extensions of concepts used in mathematical learning theory, provided the theoretical framework. Each trial of the experiment began with the selection of a leader by group vote, and ended after the designated leader made a decision for the group. Obtained and predicted results were compared for voting shifts, asymptotic leadership and state proportions, and learning trends. 5 different reinforcement groups were run and in only 1 of these groups were there major discrepancies between actual and expected results. (Author)

AD-615 203 Div. 28/1, 18/7

System Development Corp., Santa Monica, Calif.
SYSTEM SUPPORT FOR HYPOTHESIS GENERATION,
by P. R. Merrifield and E. B. Erickson. 17 Dec 64, 16p Rept. no. SP-1518
Contract SD97
Unclassified report

Pub. in Psychological Reports v16 p475-90 1965
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Statistical analysis, Military strategy), (*Military strategy, Military psychology), Experimental data, Decision making, Enemy personnel, Military tactics.

An experiment was conducted on the usefulness of a statistical summary in judging enemy intentions, in the context of a nuclear attack. The statistical summary was based on applications of correlation, factor groupings, and variance ratios. Thirty ROTC students served as Ss, playing the role of intelligence analysts in a simulated command post. Analyses of variance of scores based on analysts' judgments support two major inferences: use of the summary tends to increase the over-all goodness of judgment; and, use of the summary tends to enhance the assimilation of experience as measured by improvement in judgment scores from early to late trials. (Author)

AD-615 204 Div. 28/4

System Development Corp., Santa Monica, Calif.
PSYCHOLOGICAL TESTS AND PUBLIC RESPONSIBILITY: INTRODUCTION,
by Launor F. Carter. 1964, 2p
Rept. no. SP-1749
Unclassified report

Pub. in American Psychologist v20 n2 p123-4 Feb 1965
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Psychometrics, History), Intelligence tests, Personality, Measurement, Public opinion.

Introduction before presentation of addresses sponsored by the Board of Professional Affairs of the American Psychological Association at its annual meeting, Los Angeles, Sept. 4, 1964. The introduction reviews briefly the history of the general public in psychological tests.

AD-615 206 Div. 28/4, 28/5

System Development Corp., Santa Monica, Calif.
NOTE OF CAUTION ON THE FACTOR ANALYSIS OF THE MMPI,
by Gerald H. Shure and Miles S. Rogers. 15 Feb 64, 5p Rept. no. SP-1513/001/00
Unclassified report

Pub. in Psychological Bulletin v63 n1 p14-8 Jan 1965
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Factor analysis, Psychometrics), (*Psychometrics, Personality), (*Personality, Psychometrics), Correlation techniques, Reliability.

Although the dangers associated with factoring test scales containing overlapping items (items used on more than 1 scale) have been pointed out by Guilford (1952), factor studies of scales embodying item overlap continue. The present study explores the possibility that the neurotic triad and the psychotic triad or tetrad factors found in 4 studies derive from the existence of a methodological artifact associated with item overlap. To test this possibility, MMPI interscale common-element correlations (Produced solely by item overlap) were factor analyzed. 2 or 3 factors extracted are highly similar to neurotic triad and psychotic triad or tetrad factors found for 4 samples. These 2 factors do not appear in a factor

analysis of truncated (overlap items removed) MMPI scale scores. Since the overlap factors are based solely on the scale intercorrelations due to overlap items, these results appear to support Guilford's warning and open to question the legitimacy of these MMPI factors. (Author)

AD-615 301 Div. 30/2, 32/11
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
LARGE FILES IN LINGUISTIC COMPUTING,
by Martin Kay. May 65, 13p Rept. no. P-3136
Unclassified report

Descriptors: (*Machine translation, Data storage systems), (*Data storage systems, Language), (*Language, Computers), Vocabulary, Dictionaries, Simulation.

A typical linguistic job will bring together a number of files each very large by the standards of everyday computing: a body of text, a dictionary and a grammar. The grammar, if it is anything but a very simple one, will contain a large number of elementary items of information of different kinds, each related to others in a number of different ways. This is what it means to say that the file has a lot of structure. The dictionary may also contain grammatical codes, which may consist of characters from the alphabet of one or other of the languages or may be something altogether different. If the dictionary contains alternatives to which probabilities are assigned, then these will probably be in the form of floating-point numbers. This is what it is like for a file to contain many different kinds of information. Computer files---texts, dictionaries, grammars--have to be changed, corrected, searched, given new structures and manipulated in a host of other ways. This can only be done if we know exactly where everything is in the file--if we have some means of addressing each item and each related set of items. Suppose we have a Japanese-English dictionary organized by words rather than morphemes. This would not necessarily be the best way to organize such a dictionary for machine use but it will serve adequately as an illustration. Each entry in the dictionary will have two main parts, one for the Japanese word and one for the English. Each of these in turn may have a number of sections, one for each of the forms that the word may take when inflected. (Extracted)

AD-615 302 Div. 32/9, 23/3, 32/4
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
THE EFFECT OF THE GHETTO ON THE DISTRIBUTION AND LEVEL OF NONWHITE EMPLOYMENT IN URBAN AREAS.
Revised ed.,
by John F. Kain. May 65, 24p Rept. no. P-3059-1
Unclassified report

An earlier version of this paper was presented at the Annual Meeting of the American Statistical Association in Chicago, 27-30 Dec 64, AD-610 637. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Urban areas, Housing), (*Housing, Urban areas), (*Manpower studies, Urban areas), (*Sociology, Urban areas), Population, Urban planning, Housing projects, Distribution, Labor, Economics.

This paper empirically tests the effect of racial segregation in the housing market on the distribution and level of nonwhite employment. There is strong evidence that racial segregation is an important determinant of the distribution of nonwhite employment. Negro workers, for example, are significantly underrepresented in employment zones distant from the ghetto, and the underrepresentation increases as distance from the ghetto increases. There is highly suggestive evidence that segregation patterns in U.S. metropolitan areas affect nonwhite employment levels. Racial segregation may cost Negroes as many as 35,000 jobs in Chicago and 9,000 in Detroit. Chicago's larger labor force and greater racial segregation account for the difference in the figures for the two cities. If the dispersal and suburbanization of employment characterizing the past few decades continues, the loss of nonwhite employment opportunities resulting from patterns of housing segregation will probably increase.

AD-615 317 Div. 32/4, 23/1
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
TESTIMONY BEFORE THE COMMISSION ON MANPOWER, AUTOMATION AND TECHNOLOGY,
by Paul Armer. Apr 65, 10p
Rept. no. P-3118
Unclassified report

Remarks presented at a public hearing before the California State Commission on Manpower, Automation and Technology, Dec. 11, 1964.

Descriptors: (*Manpower studies, Automation), (*Economics, Automation), (*Automation, Economics), Production control, Costs, Labor.

The remarks concern the inability to answer the question as to the effect of automation on the size of the work force. The reason for the inability is ascribed to the lack of a controlled experiment in such matters, and a plea is made for devoting much more effort to trying to understand the economic system.

AD-615 318 Div. 32/4
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
ECONOMIC GROWTH AND POVERTY,
by Richard R. Nelson. Apr 65, 13p
Rept. no. P-3082-1
Unclassified report

Descriptors: (*United States, Economics), (*Economics, United States).

The problems of poverty in the United States, and their resolution, are inextricably connected with the nature of the economic growth process and its pace and pattern. In the past, economic growth has been primarily responsible for lifting the bulk of the population further and further away from economic deprivation, but the adjustments required by growth have left in their wake new pockets of poverty. In the future, one of the key variables that will determine how rapidly we can eliminate poverty in the United States will be the rate of increase in average incomes. And one of the key factors that will determine the kinds of new pockets of poverty that will develop will be the adjustments required by growth and how well we respond to them. This paper explores certain aspects of this dual role of economic growth in the past, and the prospects for the future. (Author)

AD-615 319 Div. 32/11
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
MEASUREMENT OF SIMILARITY BETWEEN NOUNS.
Memo.,
by Kenneth E. Harper. May 65, 25p
Rept. no. RM-4532-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Language, Analysis), Measurement, Vocabulary.

A study was made of the degree of 'similarity' between pairs of Russian nouns, as expressed by their tendency to occur in sentences with identical words in identical syntactic relationships. A similarity matrix was prepared for forty nouns; for each pair of nouns, the number of shared (i) adjective dependents, (ii) noun dependents, and (iii) noun governors was automatically retrieved from machine-processed text. The similarity coefficient for each pair was defined to be the ratio of the total of such shared words to the product of the frequencies of the two nouns in the text. The 780 pairs were ranked according to this coefficient. The text comprised 120,000 running words of physics text processed at The RAND Corporation; the frequencies of occurrence of the forty nouns in this text ranged from 42 to 328. The results suggest that the sample of text is of sufficient size to be useful for the intended purpose. Many noun pairs with similar properties (synonymy, antonymy, derivation from distributionally similar verbs, etc.) are characterized by high similarity coefficients; the converse is not observed. (Author)

AD-615 321 Div. 32/4, 04/1, 26/1
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
MAINLAND CHINA'S CHEMICAL INDUSTRY.
Memo.,
by G. B. W. Young. May 65, 18p
Rept. no. RM-4504-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*China, Chemical industry), (*Chemical industry, China), Commerce, Chemical engineering, History.

In the period from 1949 to 1964 Mainland China's chemical industry rose from eighth to fourth in modern industry ranking in terms of gross-output value. The 1949 - 1952 growth was more of a reconstruction of the industry than a growth per se. The 1953 - 1957 growth was primarily an increased production of the basic chemicals (sulfuric acid, ammonium sulfate, soda ash, caustic soda, chlorine, and the inorganic salts). The 1958 - 1964 growth included the expansion of mass-production capability into many new chemical industries, such as the rubber, fertilizer, pharmaceuticals, plastics, and synthetic-fiber industries. Related foreign-trade negotiations have recently emphasized the import of complete chemical plants from Western Europe and Japan. Mainland China also appears to have acquired some capability to design, manufacture, and construct complete sets of chemical plants. This capability is currently being augmented through increased trade with Western Europe and Japan. (Author)

AD-615 357 Div. 28/5

North Dakota State Univ., Fargo.
ATTITUDE CHANGE AND COMMUNICATION-ATTITUDE DISCREPANCY,
by James O. Whittaker. 27 Jun 63, 8p
Grant AF AFOSR62 188
AFOSR 65-0710

Unclassified report

Pub. in Journal of Social Psychology v65 p141-7 1965(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Attitudes, Social communication), (*Social communication, Attitudes), Social psychology, Communication theory.

The results of the experiment indicate that there is a curvilinear relationship between attitude change and communication-attitude discrepancy. Communications presenting stands relatively close to the subject's position result in less change than do those further removed. A point is reached, however, beyond which greater discrepancies result in diminished change. These data suggest that there is an optimal discrepancy between the stand of the communication and the position or attitude of the subject which results in maximum change. To insure the maximum effect from persuasive communications, assessment of the distribution of attitudes held by the target audience must be made, and the deviation or discrepancy of the position of the communication must be determined on the basis of this distribution. (Author)

AD-615 360 Div. 28/1, 28/3

Iowa State Univ., Iowa City.
THE POSITION OF FOUR RESPONSE VARIABLES IN A FACTOR ANALYSIS AND THEIR RELATIONSHIP TO ANXIETY AND STRESS (Die Stellung von Vier Motorischen Variablen in einer Faktoren-analyse und ihre Beziehungen zu Angst und Stress),
by Otfried Spreen. 24 Apr 64, 16p
Contract AF61 052 483
AFOSR 65-0594

Unclassified report

Pub. in Psychologische Forschung v27 p403-18 1964 (Copies available only to DDC users).
Text in German.
See also AD-292 795.

Descriptors: (*Motor reactions, Factor analysis), (*Anxiety, Motor reactions), (*Stress (Psychology), Motor reactions), Reaction (Psychology), Stress (Physiology), Behavior, Performance (Human), Hands, Motion.

AD-615 362 Div. 32/2, 31/4

Pennsylvania Univ., Philadelphia.
THE ASHERAH; A SUBMARINE FOR ARCHAEOLOGY,
by George F. Bass. 1965, 9p
Contract Nonr454000

Unclassified report

Pub. in Archaeology v18 n1 p7-14 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Archaeology, Submarines), (*Submarines, Archaeology), Photogrammetry, Underwater cameras, Underwater objects.

AD-615 363 Div. 23/5, 18/4, 28/5

Bureau of Social Science Research, Inc., Washington, D. C.
CAPTIVITY LORE AND BEHAVIOR IN CAPTIVITY.
Reprint,

by Albert D. Biderman. 1964, 28p
Contract AF49 638 727
AFOSR 65-0577

Unclassified report

Copies not available to DDC or Clearinghouse customers. Research supported in part by the Inter-University Seminar on Military Organization of the University of Chicago.

Descriptors: (*Prisoners, Behavior), Sociology, Social psychology, Military psychology, Military personnel, Civilian personnel, Culture, North Korea, China.

Largely impressionistic observations from a number of documentary and interview studies of the subject of captivity suggest hypotheses concerning relationships between precapture exposure to cultural lore about captivity and behavior as a captive. The present discussion focuses on the prisoner of war, particularly on studies of survivors of captivity in Korea and China. The writer has also drawn upon information concerning other captivity statuses, however, including civilian internees and political and concentration-camp prisoners. (Author)

AD-615 375 Div. 28/1, 08/7

Aerospace Medical Research Labs. Wright-Patterson AFB, Ohio.
PREDICTION OF BEHAVIOR UNDER CONDITIONS OF UNCERTAINTY.
Final rept. for Sep 60-May 62,
by Julian O. Morrissette and William H. Pearson.
1 Jun 62, 11p AMRL TR-65-15
Proj. 7184, Task 718403

Unclassified report

Pub. in Journal of Experimental Psychology v65 n4 p391-7 1963
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Behavior, Probability), (*Probability, Behavior), (*Performance (Human), Probability), Entropy, Target discrimination, Statistical processes, Stochastic processes, Human engineering.

Erratic lines approaching a target space were presented to Ss and described as paths of aircraft approaching a complex of (9) targets. Ss predicted the 3 targets each path was most likely to intersect. S performance (predictions) was evaluated against the probability of each target being intersected by a path, where this probability was computed mathematically. By sampling from an information source, whose entropy, H, was held constant, 10 basic paths of varying sample entropy, H', were constructed. Each of the 10 paths was truncated at 3 different lengths (in effect, 3 different sample sizes), yielding 30 paths, each with a unique H'. 2 hypotheses were proposed: (a) S performance would be superior on samples of low H' as compared with samples of high H', and (b) S performance would improve as sample size increased. The analysis of the data produced statistically significant differences consistent with the hypotheses. (Author)

AD-615 376 Div. 28/1

Miami Univ., Oxford, Ohio.
GROUP PERFORMANCE UNDER VARIOUS CONDITIONS OF WORK LOAD AND INFORMATIONAL REDUNDANCY.
Final rept. for Sep 61-Nov 62,
by Julian O. Morrissette, Clarke W. Crannell, and S. A. Switzer. 19 Nov 62, 15p
Contract AF33 616 7132, Proj. 7184, Task 718403
AMRL TR-65-16

Unclassified report

Pub. in The Journal of General Psychology v71 p337-47 1964
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Group dynamics, Learning), (*Learning, Group dynamics), Performance (Human), Psychometrics, Recall, Errors, Analysis of variance.

Twelve 5-man groups were run under each of 10 experimental conditions: Cooperative (C) versus Independent (I) by five conditions of workload-redundancy (W-R)--W20-R0.0, W30-R0.5, W40-R1.0, W50-R1.5, W60-R2.0--where W20-R0.0 means that 20 items (3-digit numbers) were presented to each group member, with no redundant items given to the group; W30-R0.5 means that 30 items were presented to each group member, with one-half (0.5) of the 100 items repeated, ie; redundant in the group, etc. With respect to correct recall: (a) W-R did not produce a significant effect, indicating that the negative effects of increased work load and the positive effects of increased redundancy were equal and opposite; (b) I groups were significantly better than C groups. With respect to recall errors: (a) errors increased significantly as W-R increased; (b) C groups made significantly fewer errors than I groups. Considering the ratio of errors to the total number of items reported, I groups produced a significantly greater proportion of misinformation than C groups, with the difference increasing with W-R. (Author)

AD-615 393 Div. 32/8
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
THE SOVIET UNION SIX MONTHS AFTER KHRUSHCHEV'S FALL,
by Thomas W. Wolfe. Apr 65, 27p
Rept. no. P-3120

Unclassified report

Descriptors: (*Foreign policy, USSR), (*USSR, Foreign policy), Leadership, Government (Foreign), Political science, Economics, Communism, Defense systems, Armed forces budgets.

Foreign and domestic policies of the USSR under the leadership of Brezhnev and Kosygin are discussed. It is concluded that Soviet policy abroad--both with regard to the contest with the West and the problems of Soviet leadership within the communist world--seems to present the new regime with challenges no less exacting than those faced by Khrushchev. It is also believed that in at least one respect, notably in Southeast Asia, the new regime finds itself in a position a good deal more critical than at the time it assumed power in Moscow.

AD-615 395 Div. 26/2, 18/3, 32/4
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
PRICING POLICIES CONTINGENT ON OBSERVED PRODUCT QUALITY,
by Eugene P. Durbin. May 65, 23p
Rept. no. P-3142
Contract Nonr22553

Unclassified report

Descriptors: (*Economics, Government procurement), (*Government procurement, Economics), (*Optimization, Government procurement), Production control, Quality control, Linear programming, Game theory, Costs.

Expanded use of incentive contracts has created interest in procurement arrangements in which unit purchase price varies as a function of observed product quality. Under the assumption that at a known cost, a producer can control the true quality of his output, a production and procurement situation is described in which a risk-averse producer and consumer both attempt to maximize expected profit --the consumer by selecting a pricing strategy and sample size, and the producer by then selecting the product quality. Let product quality be denoted by p. The consumer will desire the selected product quality to be some p'. If at a fixed sample size, n, a price schedule exists which is acceptable to the risk-averse producer and also maximizes producer expected profit at p', this price schedule is a 'motivating' price schedule. For fixed (n,p), a motivating price schedule must be the solution to a specified linear programming problem. It will be a piecewise constant function of the observed quality and need have no more than six distinct price levels. A method of deriving continuous, piecewise-linear price schedules is briefly described, and extensions of the basic approach are noted. (Author)

AD-615 416 Div. 26/2, 28/2

Carnegie Inst. of Tech., Pittsburgh, Pa.
Graduate School of Industrial Administration.
QUASI-RATIONAL MODELS OF BEHAVIOR IN ORGANIZATION RESEARCH.
Technical rept.,
by A. Charnes and A. C. Stedry. Mar 65, 37p
Management sciences research rept. no. MSRR-31
Contract Nonr76024, Proj. NR047 048
Unclassified report

Prepared in cooperation with Northwestern Univ., Evanston, Ill. Technological Inst., Contract Nonr122810, Proj. NR047 021.
Revision of rept. dated 5 Aug 64, AD-608 246.
Available only for reference at DDC field services. Copy is not available for public sale.

Descriptors: (*Management control systems, Model theory), (*Behavior, Management control systems), Economics, Mathematical models, Mathematical programming.

Two approaches to organization theory having origins in economic theory are investigated for their relevance to problems of organization control. A third approach is explored via the construction of quasi-rational models of goal oriented behavior, incorporating features of both of the others. The need for such models is discussed as well as their general relevance to the pursuit of knowledge of the description and design of organization control systems. (Author)

AD-615 421 Div. 28/1

Michigan Univ., Ann Arbor.
CATEGORIES OF HUMAN LEARNING,
ed. by Arthur W. Melton. 1964, 365p
Contract Nonr122437
Unclassified report

Papers presented at the Symposium on the Psychology of Human Learning, Univ. of Michigan, Ann Arbor, 31 Jan and 1 Feb 62.
Available from Academic Press, Inc., 111 Fifth Avenue, New York, N. Y. 10003.

Descriptors: (*Learning, Symposia), Humans, Conditioned reflex, Reaction (Psychology), Verbal behavior, Memory, Behavior, Perception (Psychology), Motor reactions, Classification, Probability, Sampling.

Contents: Classical and operant conditioning; Categories of learning and the problem of definition; Representativeness of rote verbal learning; Centrality of verbal learning; Probability learning; Evaluation of stimulus sampling theory; Short-term memory and incidental learning; Behavioral effects of instruction to learn; Concept of the concept; Verbalizations and concepts; Perceptual-motor skill learning; Generality of research on transfer functions; Problem solving; Learning and problem solving; Taxonomy of human learning.

AD-615 424 Div. 32/3, 32/11
CFSTI Prices: HC$4.00 MF$1.00

Lockheed Missiles and Space Co., Palo Alto, Calif.
THE APPLICATION OF ENGLISH-WORD MORPHOLOGY TO AUTOMATIC INDEXING AND EXTRACTING.
Annual summary rept.,
by J. L. Dolby, L. L. Earl, and H. L. Resnikoff.
Apr 65, 142p Rept. no. M-21-65-1
Contract Nonr444000
Unclassified report

Descriptors: (*Subject indexing, Automatic), (*Abstracting, Automatic), (*Language, Subject indexing), Dictionaries, Machine translation, Test methods.

Contents:
Use of syntax in the identification of 'indexible' sentences, by J. L. Dolby and H. L. Resnikoff (outline of bases and objectives of the study): Syntax and information, assignment of syntactic codes, measuring the accuracy and the construction of a part-of-speech algorithm, selection of a test corpus
Progress report on indexing by part-of-speech strings, by Lois L. Earl: Program and algorithm design, part-of-speech test results, test analysis, proposed experiments, sentence dictionary system
Nature of affixing in written English, by H. L. Resnikoff and J. L. Dolby (to appear in 'Mechanical Translation')
Inflection of written English verbs, by H. L. Resnikoff and J. L. Dolby: Regular paradigms, systematic 'irregularities', irregular verbs, affix in context problem, inflection algorithm, accuracy test, errors of algorithm.

AD-615 446 Div. 23/5, 16/7, 23/4
CFSTI Prices: HC$3.00 MF$0.75

Pittsburgh Univ., Pa. Graduate School of Public Health.
A STUDY OF THE INSERVICE TRAINING PROGRAM FOR SPECIALIZED MEDICAL TECHNICIAN AND THE POST MILITARY EMPLOYMENT OF THESE TECHNICIANS.
Master's thesis,
by Herbert E. Straughn. 1964, 81p
Unclassified report

Descriptors: (*Civilian personnel, Medical technicians), (*Medical technicians, Air force personnel), (*Air force training, Medical technicians), Education, Selection, Hospitals.

The inservice training program for Specialized Medical Technicians in Air Force hospitals is described and the requirements for selection to the program are outlined. A study of 220 discharged and retired trained technicians was conducted to determine whether the technical training they received influenced their seeking and securing employment in civilian hospitals or related health fields. The study was based upon the evaluation of such characteristics as age, sex, number of dependents, rank, length of service, salaries, and types of employment.

Those surveyed were placed into five fields of activity: employed in hospitals and related health fields; employed in non-health fields; school, health related; school, non-health related; and unemployed. The results of the study indicate that the technical training of the Specialized Medical Technicians did influence their securing employment in hospitals. It was also determined that a large trained labor force does exist but is not available to hospitals for employment. (Author)

AD-615 458 Div. 32/9, 32/5, 32/8, 32/13
CFSTI Prices: HC$1.00 MF$0.50

Special Operations Research Office, American Univ., Washington, D. C.
HUE, AS A TRADITIONAL CITY OF VIETNAM. Research notes,
comp. by Skaidrite Maliks. 21 Dec 64, 18p
SORO/CINFAC/27-64

Unclassified report

Descriptors: (*Political science, Vietnam), (*Vietnam, Sociology), Urban areas, Culture, Religion, History, Government (Foreign).

AD-615 459 Div. 32/9, 32/1
CFSTI Prices: HC$4.00 MF$1.00

Special Operations Research Office, American Univ., Washington, D. C.
A SELECTED INVENTORY OF LATIN AMERICAN AGRICULTURAL COLONIES WITH ANNOTATED BIBLIOGRAPHY,
comp. by Curtin Winsor, Jr. and Joseph Macrum.
1964, 134p SORO/CINFAC/18-65

Unclassified report

Descriptors: (*Rural areas, South America), (*South America, Rural areas), (*Central America, Rural areas), Agriculture, Bibliographies, Brazil, Chile, Colombia, Ecuador, Guatemala, Honduras, Peru, Venezuela.

With a few noted exceptions, this paper is limited in its scope to agricultural colonies and settlements that were founded after 1945 and had sufficient literature to justify a profile-outline. As such, the paper identifies only a small part of the literature on the process of land settlement in present-day Latin America. (Author)

AD-615 470 Div. 28/5
CFSTI Prices: HC$1.00 MF$0.50

New Hampshire Univ., Durham.
A MAP FOR EXPLORATIONS IN ROLECENTRISM,
by Brian R. Kay. 1965, 24p
Technical rept. no. TR-1
Contract Nonr371003, Proj. NR170 315

Unclassified report

Descriptors: (*Behavior, Social psychology), (*Social psychology, Behavior), Personality, Perception (Psychology), Labor, Performance (Human), Attitudes, Group dynamics, Personnel.

A theoretical framework for behavior identified as 'rolecentric' is presented within the general context of self-role interaction. Rolecentrism is defined as a concern with one's own role such that the role behavior of others is monitored, perceived and evaluated for its impact on one's self-prescribed role. The forces responsible for the formation, retention, and change in self-other expectations that in combination define the self-prescribed role, are discussed. (Author)

AD-615 486 Div. 32/11, 32/3, 30/2
CFSTI Prices: HC$3.00 MF$0.75

Istituto Documentzaione della Associazione Meccanica Italiana, Milan.
'MULTISTORE' A PROCEDURE FOR CORRELATIONAL ANALYSIS.
IDAMI Language Research Section, Informal rept.,
by Ernst v. Glasersfeld. Jan 65, 87p
Rept. no. ILRS-T10-650120
Grant AF EOAR64 54
AFOSR 65-0584

Unclassified report

Descriptors: (*Language, Analysis), Correlation techniques, Machine translation, Documentation, Classification, Punched cards, Computer storage devices, Input-output devices.

After a short introduction to correlational theory, the paper explains and describes a new procedure for correlational analysis for single sentences in English. It shows how grammatical, syntactic, and semantic data can be handled in one coherent program by means of a specially organised memory which we have called the 'Multistore'. The system eliminates the need for comparisons of indices and ascertains the compatibility of elements (in this case, words and phrases) by inserting the indices that characterise each element into pre-established individual 'columns', each of which has its own fixed combination rules based on the rules of word-order in current English. The system yields a complete listing of the operative correlations (roughly corresponding to syntactic connections) and their hierarchical structure in a given sentence. Summary flow charts and an example of the procedure are added to the text. (Author)

AD-615 488 Div. 32/3, 04/2, 04/3, 30/2
CFSTI Prices: HC$1.00 MF$0.50

American Chemical Society, Ohio State Univ., Columbus.
STATISTICAL DATA ON CHEMICAL COMPOUNDS.
Final rept.,
by Peter M. Bernays. Mar 65, 15p
Contract DA18 035AMC299A,
Task 2P023201A72002

Unclassified report

Descriptors: (*Chemical compounds, Information retrieval), (*Information retrieval, Chemical compounds), Molecular structure, Bibliographies, Data processing systems, Data storage systems, Feasibility studies, Computers, Statistical data, Documentation, Army.

In order to determine the magnitude of the task and the size of the computer system necessary for the Army Chemical Information and Data System certain CAS files have been studied for data on chemical structure, chemical nomenclature, and bibliographic references. Statistical samples were taken, and data are presented. (Author)

AD-615 496 Div. 23/4, 13/4, 18/1, 28/1, 28/5
CFSTI Prices: HC$3.00 MF$0.75

New Mexico Dept. of Education, Santa Fe.
A COMPARATIVE STUDY OF THE EDUCATIONAL ENVIRONMENT AND THE EDUCATIONAL OUTCOMES IN AN UNDERGROUND SCHOOL, A WINDOWLESS SCHOOL AND CONVENTIONAL SCHOOLS.
Final rept.,
by James G. Cooper and Carl H. Ivey. Aug 64, 88p
Contract OE3 99 033 Unclassified report

Rept. on ABO Proj.

Descriptors: (*Confined environments, Education), (*Education, Confined environments), Underground structures, Shelters, Students, Instructors, Anxiety, Social psychology, Attitudes, Learning, Personality, Achievement tests, Adjustment (Psychology), Psychometrics, Costs, Construction, Operation, Maintenance, Radioactive fallout, New Mexico.

The purpose of this investigation was to determine whether pupils attending a school-fallout shelter succeed as well as those who are enrolled in conventional schools. Harmful effects that could be attributed to attending an underground school-fallout shelter were investigated. The major hypothesis tested in this study was that there are no significant differences in educational outcomes (overall achievement, emotional stability, physical health, and attitudes) among pupils in conventional, windowless, and underground schools.

AD-615 501 Div. 32/3, 30/1
CFSTI Prices: HC$5.00 MF$1.00

AuerbachCorp., Philadelphia, Pa.
DOD USER NEEDS STUDY, PHASE I, VOLUME I.
Final technical rept.,
by Lawrence H. Berul, Michael E. Elling, Allan Karson, Arnold B. Shafritz, and Harry Sieber.
14 May 65, 176p Rept. no. 1151-TR-3
Contract SD219

Unclassified report

See also AD-601 259 and AD-615 502.

Descriptors: (*Department of Defense, Documentation), (*Information retrieval, Department of Defense), (*Engineering personnel, Information retrieval), (*Scientific personnel, Information retrieval), Bibliographies, Psychometrics, Scientific research.

An interview-based survey of the DOD RDT and E population was conducted to determine how DOD scientists and engineers presently acquire and use scientific and technical information. Depth interviews were conducted with 1375 respondents randomly selected from the 36,000 members of the DOD RDT and E population. The critical incident interviewing technique was used to isolate a recently completed task, and to define the characteristics (e.g., depth, volume, class, timeliness, field media) of the information acquired and used in the performance of that task. A semi-structured interview guide and handbook were developed and used to ensure consistency of question interpretation. A data compilation system and computer programs were developed to compile, analyze, compress, and present the data. Approximately 600 one-way, two-way and three-way tables were prepared to aid in the analysis. Volume I consists of three sections entitled: Management Report, Conduct of Study, and Analysis of Data, plus four appendices entitled: Study Execution, Discussion and Results of Survey Questions, Bibliography of User Studies, and Glossary. (Author)

AD-615 502 Div. 32/3, 28/4, 30/1
CFSTI Prices: HC$6.00 MF$1.50

Auerbach Corp., Philadelphia, Pa.
DOD USER NEEDS STUDY, PHASE I, VOLUME II.
Final technical rept.
14 May 65, 274p Rept. no. 1151-TR-3
Contract SD219

Unclassified report

See also AD-601 259 and AD-615 502.

Descriptors: (*Department of Defense, Documentation), (*Information retrieval, Department of Defense), (*Engineering personnel, Information retrieval), (*Scientific personnel, Information retrieval), Psychometrics, Scientific research, Handbooks, Programming (Computers), Tables, Scientific data.

Volume 2 has 3 sections: Interview Guide Handbook; computer program documentation; and statistical tables.

AD-615 516 Div. 32/8
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
A TIME FOR REFLECTION,
by E. Vandevanter, Jr. Mar 65, 12p
Rept. no. P-3079

Unclassified report

Descriptors: (*Foreign policy, United States), Political science, United States Government, Arms control, Defense systems, Government (Foreign), Leadership, Decision making, Economics.

AD-615 534 Div. 28/3, 16/1, 23/5
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE DYNAMICS OF EMOTIONAL-VOLITIONAL PROCESSES DURING PARACHUTE JUMPS BY ASTRONAUTS,
by G. F. Khlebnikov and V. I. Lebedev. 11 May 65, 17p FTD-TT-65-437
TT 65-62301

Unclassified report

Unedited rough draft trans. of Voprosy Psikhologii (USSR) v10 n5 p3-10 1964.

Descriptors: (*Astronauts, Parachute jumping), (*Parachute jumping, Astronauts), Psychophysiology, Training, Emotions, Electrocardiography, Pulse rate, Performance (Human), Behavior, USSR.

Soviet cosmonauts were observed during their preliminary parachute jumping trainings. Before emplaning, in the plane and after landing, the heart-rate was measured and the dynamometry of hands was carried out as well. The registration of changes of hands' strength and those of the heart-rate disclosed the dynamics of the emotional 'tuning' of cosmonauts to the coming parachute jumpings. On the first day of parachute jumping the emotional reactions were significant and were markedly different from emotional reactions of well-trained parachutists. Subsequently, the reactions became more adequate and due to the training of volitive processes the emotional manifestation at the repeated parachute jumpings became weak. The emotional reactions to danger are characterized by 'sthenic' excitation which is evoked by the activation of the conscious regulation of behavior. All cosmonauts had the most stable positive emotions at the second stage of parachute jumping trainings (jumping onto the water, during nights, in the diving suits).

AD-615 583 Div. 26/2, 16/7, 16/8
CFSTI Prices: HC$3.00 MF$0.75

Pittsburgh Univ., Pa.
AN ADMINISTRATIVE SURVEY OF THE PEDIATRIC OUTPATIENT CLINIC IN AN AIR FORCE HOSPITAL.
Master's thesis,
by Robert W. Parker. 1965, 77p Unclassified report

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Descriptors: (*Military medicine, Air Force), (*Hospitals, Air Force), Medical examination, Diagnosis, Therapy, Medicine, Children, Statistical data, Public health, Medical personnel, Standards, Tables.

The survey was conducted in a 175 bed United States Air Force medical treatment facility located in east-central Illinois and was concerned with a review and recommendations on the following subjects: appointment system, clinic session, statistical data, record procedures, physical facilities and interrelations (hospital departments and outside health related agencies). The techniques used were interview, observation, review of documentary material and statistical data. A review of the existing situation was made, and documented, and related to documentary materials and statistical data. Problem areas identified were insufficient space, lack of training program for the appointment clerk, inadequate health education and public relations program, insufficient statistical data and lack of formalized written procedures for clinic operation. Following problem identification, recommendations were presented as to possible solutions, or the area in which further study should be conducted. (Author)

AD-615 586 Div. 26/2, 18/3, 30/1
CFSTI Prices: HC$4.00 MF$0.75

George Washington Univ., Washington, D. C.
AN ANALYSIS OF THE PROCUREMENT METHODS EMPLOYED BY THE DEPARTMENT OF THE AIR FORCE IN SUPPORTING BASIC RESEARCH AT EDUCATIONAL INSTITUTIONS.
Master's thesis,
by Russell R. Rausch. Jun 65, 101p
Unclassified report

Descriptors: (*Air force procurement, Scientific research), (*Scientific research, Universities), (*Universities, Scientific research), Armed forces procurement, Department of Defense, Commerce, Analysis.

Conclusions: Policies and procedures established in the past for an essentially supply-oriented procurement system are largely inappropriate for use in research. It is difficult to understand why universities should be penalized by having to absorb indirect costs for research which is conducted in the interest of national security. To defend the limitation of the basis that grants to educational institutions are no more than Federal aid to education is unsound. Such activity is certainly not a part of the mission of the Department of Defense. The grant is considered as merely another procurement tool to be used with discretion in lieu of the contract if such use is in consonance with objectives. Except for the instances which do not result in economic loss, the agencies of the Department of Defense are in the same position as they were prior to passage of Public Law 85-934. The grant is not a suitable instrument for establishing a sound business relationship between the Government and the universities. Although it has been used successfully by such agencies as the National Science Foundation and the National Institutes of Health, the mission of each of these agencies is different from that of the DOD. However, the contract, when used for a basic research study, also does not provide an appropriate relationship.

AD-615 588 Div. 26/2, 16/7, 16/8
CFSTI Prices: HC$3.00 MF$0.75

Minnesota Univ., Minneapolis.
A STUDY OF THE WORKLOAD PLACED BY RETIREES AND THEIR DEPENDENTS ON THE LABORATORY AND X-RAY DEPARTMENTS OF AN AIR FORCE HOSPITAL,
by James E. Richardson. Mar 65, 87p
Unclassified report

Descriptors: (*Military personnel, Hospitals), (*Military medicine, Hospitals), (*Hospitals, Air force), Medical laboratories, Air force personnel, X-rays, Medical examination, Diagnosis, Statistical analysis, Analysis of variance, Tables.

The study is an attempt to determine whether retired military personnel and their dependents place a greater workload on the laboratory and x-ray departments of USAF Hospital Kessler than do active duty personnel and their dependents. Although the findings of this study may not be generalized appropriately to other hospitals, it is felt that some insight may be gained into the problem of providing medical care for retired military people.

AD-615 605 Div. 32/3
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
A GUIDE FOR THE PREPARATION OF INDEXES,
by Eleanor T. Harris. Apr 65, 39p
Rept. no. P-3106
Unclassified report

Descriptors: (*Indexes, Preparation), Bibliographies, Instruction manuals.

Contents:
The author and his index
Marking entries
From copy to cards
Editing the cards
Typing the cards
Bibliography

AD-615 624 Div. 18/1, 20/2, 32/4
CFSTI Prices: HC$3.00 MF$0.75

Institute for Defense Analyses, Arlington, Va.
Economic and Political Studies Div.
PROTECTING INDUSTRIAL RESOURCES AGAINST NUCLEAR ATTACK: INTERIM REPORT OF AN ECONOMIC ANALYSIS,
by Henry M. Peskin. Feb 65, 65p
IDA HQ-65-3550, S-187
Contract OCD OS63 134, Task 4113C
Unclassified report

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Descriptors: (*Industries, Nuclear warfare), (*Nuclear warfare, Industries), Economics, Civil defense systems, Population, Mathematical models, Budgets, Production, Analysis.

This study describes a method for allocating an assumed budget for the protection of industrial resources from nuclear attack. The objective of the allocation is to help ensure that the surviving population has the resources it needs for its support. The model is a linear program

consisting of production relations, final-demand relations, and civil-defense protection relations. The model was applied in a pilot study that reflects the characteristics of the assumed attack (protected population, heavy industrial damage), whose principal conclusions are: (1) The destruction to industrial resources would be proportionately greater than the population loss; this would result in a very low per capita income by present US standards. (2) By changing the basic post-attack demand conditions from unrestricted GNP maximization to base-year proportions (1958), the post-attack GNP was reduced by over 50 percent; with a minimal requirement vector restriction, the GNP fell by over 50 percent again. (3) Setting final-demand goals for specific sectors of post-attack economy would further reduce the maximum achievable GNP. (4) Only slightly more than half the posited minimal demands of the surviving population were met with a maximum labor utilization.

AD-615 631 Div. 23/1, 28/5
CFSTI Prices: HC$4.00 MF$1.00

Nebraska Univ., Lincoln.
A STUDY OF AIR FORCE PERSONNEL PROBLEMS ASSOCIATED WITH REMOTE OR ISOLATED ASSIGNMENTS.
Master's thesis,
by Jack E. Ladds. 1965, 119p
Unclassified report

Descriptors: (*Air force personnel, Arctic regions), (*Military psychology, Air force personnel), Polar regions, Adjustment (Psychology), Military facilities, Early warning systems, Military requirements, Physical fitness, Motivation, Leadership, Manpower studies, Wages, Stress (Psychology), Selection.

Conclusions: (1) The security of the US and the free world is endangered by the inability of the Air Force to retain its skilled and 'hard core' technicians beyond their first enlistment. (2) Livingconditions and recreational facilities are unsuitable at remote overseas stations. The benefits derived by improving these facilities would probably be offset by savings in training costs that would accrue from a higher retention rate. This would, in turn, relieve the tedium of monotony. (3) The proposed rates of monthly basic pay fall short of raising military compensation to a level comparable to that in other segments of our economy and the Federal Government. (4) There is a need for a status symbol or recognition factor to increase prestige of men at remote sites. (5) Efforts to develop and utilize selection techniques as a means of minimizing personal adjustment problems, and thus improve morale and retention of personnel assigned to isolated stations, have proven only marginally successful. It would be more desirable to concentrate selection efforts principally on screening out the extremely unfit. (6) The Air Force lacks an adequate personalized screening and selection process to identify key personnel possessing those leadership qualities needed to insure accomplishment of the station mission. (Author)

AD-615 655 Div. 26/2, 18/3
CFSTI Prices: HC$3.00 MF$0.75

RAND Corp., Santa Monica, Calif.
A REVIEW OF AIR FORCE PROCUREMENT, 1962-1964.
Memo.,
by George R. Hall and Robert E. Johnson. May 65,
109p Rept. no. RM-4500-PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Air force procurement, History), Costs, Industries, Commerce, Armed forces procurement, Industrial procurement, Government procurement, Management control systems.

Conclusions: The goal of procurement is to obtain the goods and services needed for the Air Force's mission at economically optimal prices. Only 2 per cent of the total obligations studied were explicitly justified on socio-political grounds. Military procurement, differs from many other public policies, such as urban renewal or poverty eradication, where non-economic factors play vital roles. Procurement also differs from many of the regulated industries where the goal is a 'fair' price, with 'fair' having primarily a legal rather than an economic definition. The method used by the Air Force to obtain economically satisfactory procurement results usually is negotiation. Formal advertising is seldom used, and, considering the items purchased by the Air Force, it is hard to see how it could ever be a major method of purchasing. In the negotiation process, design and technical rivalry usually determine which potential supplier will receive the contract. Formal price competition plays only a minor role as a contractor selection criterion. The most important explanation given by contracting officers of the need for negotiating contracts is that prior investment in a program has 'locked-in' the government to a particular supplier.

AD-615 656 Div. 26/2, 18/3
CFSTI Prices: HC$3.00 MF$0.75

RAND Corp., Santa Monica, Calif.
PUBLIC POLICY TOWARD SUBCONTRACTING.
Memo.,
by Robert E. Johnson and George R. Hall. May 65,
58p Rept. no. RM-4570-PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Armed forces procurement, Control), Government procurement, Management control systems, Commerce, Industries, Weapon systems, Costs.

The Memorandum considers the rationale for public regulation of subcontracting, analyzes current subcontracting policy, and suggests changes in current policy. The need for subcontracting regulation in the acquisition of weapon systems depends on the method usedto select a prime contractor and the type of contract between the prime contractor and the Government. For all contracts let without effective price competition -- these include but are not limited to all cost types of contracts -- the Government should be concerned with decisions both about which items to subcontract and which firms are to receive the subcontracts. Such regulation is needed because prime contractors lack the motivation to minimize target costs. The need for public concern about subcontracting is brought out by an examination of the C-141 program, which has a number of atypical features. The most interesting aspect is the extensive use of competitive bidding to choose subcontractors, which demonstrates the feasibility of extensive price rivalry.

AD-615 698 Div. 28/3, 16/1

Tufts Univ., Medford, Mass.
VISUAL IMAGERY PRODUCED BY RHYTHMIC PHOTIC STIMULATION: PERSONALITY CORRELATES AND PHENOMENOLOGY,
by Sanford J. Freedman and Patricia A. Marks.
21 Nov 63, 18p
Grant AF AFOSR62 11
AFOSR 65-0711 Unclassified report

Pub. in British Journal of Psychology v56 n1 p95-112 1965 (Copies available only to DDC users).

Descriptors: (*Psychophysiology, Optical images), (*Personality, Sensory perception), (*Vision, Stimulation), Perception (Psychology), Reaction (Psychology), Projective techniques, Sensory deprivation, Anhalonium alkaloids, Electroencephalography, Motivation, Emotions, Geometric forms, Colors, Light, Correlation techniques.

This study is concerned with relationships between descriptions of visual imagery produced by rhythmic photic stimulation and a number of personality tests. Individuals who manifested the ability to suspend their generalized reality-orientation described more imagery; imagination and suggestibility also seemed to be important. Subjects' expectations about what they would see influenced their reports, although comprehension of the experimental design, fatigue and motivation were not relevant. The correlated personality variables indicate a close relationship with other types of visual imagery; the phenomenology fits a synthesized description of sensory deprivation, mescaline, and hypnagogic imagery. (Author)

AD-615 707 Div. 32/4
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
FULL EMPLOYMENT POLICY AND ECONOMIC GROWTH,
by Richard R. Nelson. May 65, 24p
Rept. no. P-3072-1

Unclassified report

Descriptors: (*Economics, Labor), Money, Stabilization, Mathematical models.

Within the context of a simple aggregative model, the paper explores the relationship between the factors that determine the rate of growth of potential output -- principally labor force growth and technical advance -- and the fiscal and monetary policies needed to achieve and maintain full employment. The model attempts to integrate two strands of analysis that have developed in the literature -- a neo-classical strand stemming from Solow's work on the growth of full employment output and a neo-Keynesian strand stemming from the Harrod-Domar studies of the conditions under which full employment can be maintained when the dual demand generating and capacity creating roles of physical investment are both recognized. (Author)

AD-615 708 Div. 26/2, 30/2
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
A CHARTING TECHNIQUE FOR THE ANALYSIS OF BUSINESS SYSTEMS,
by Edward A. Nelson. May 65, 15p
Rept. no. P-3109

Unclassified report

Descriptors: (*Commerce, Analysis), (*Management planning, Decision making), (*Decision making, Management planning), Computers, Data processing systems.

This paper describes a charting technique useful in the analysis of business systems and in studies of the information economics of the firm. The decision block charting technique provides a method that (1) Provides a simple, concise picture of system elements and relationships. (2) Portrays all pertinent factors. (3) May be used at any desired level of system detail. (4) Helps to structure research in information economics or decision processes. (5) Aids the determination of criteria for system effectiveness. This method may be used to survey and describe an existing system or in planning advanced systems. It is not restricted to any particular kind of business or information system. (Author)

AD-615 713 Div. 28/1
CFSTI Prices: HC$3.00 MF$0.75

System Development Corp., Santa Monica, Calif.
AN OPTIMAL STRATEGY FOR THE PRESENTATION OF PAIRED-ASSOCIATE ITEMS.
Final rept. for 15 Mar-64-15 Mar 65,
by Robert E. Dear, Harry F. Silberman, Donald P. Estavan, and R. C. Atkinson. 10 Mar 65, 56p
TM-1935/101/00
Contract Nonr442100

Unclassified report

Descriptors: (*Learning, Optimization), (*Optimization, Learning), (*Conditioned reflex, Optimization), Sampling, Training, Mathematical models, Probability, Experimental data, Psychometrics.

This study was concerned with the implementation of certain mathematical results that give optimal ways to present stimulus items in learning experiments. This optimization theory is based on a stimulus-sampling model of a learning experiment. We assumed that this particular model of learning would describe paired-associates learning and then compared the effects of training subjects in several paired-associates experiments by the optimal strategy and by another simple presentation strategy. Our empirical results did not support the adequacy of the assumed model of learning for representing the learning processes in these experiments. In particular, it appears that suitable models of these learning situations must incorporate some mode of representation of short-term retention. (Author)

AD-615 714 Div. 23/4, 30/2, 30/5
CFSTI Prices: HC$1.00 MF$0.50

System Development Corp., Santa Monica, Calif.
THE IMPACT OF THE COMPUTER ON SCHOOL SYSTEMS.
Professional paper,
by John G. Caffrey. 23 Sep 64, 9p
Paper no. SP-1803

Unclassified report

Descriptors: (*Education, Data processing systems), Computers, Costs, Training, Personnel, Systems engineering, Automation, Decision making, Students.

The term 'computer' should be understood, in an educational context, to include automatic data processing equipment of all kinds. Although a relatively small number of school systems now use computers, it is estimated that these systems enroll a very large proportion of the total school population. The principal applications of computers have been in the areas of administration, pupil personnel and guidance systems, research and evaluation, and instruction. At first used largely for record-keeping and related transactions, the most important result of EDP systems has been the by-product of data forresearch and evaluation as well as for projection and simulation in decision-making and planning. Instruction in data processing itself, especially in computer programming, has opened the door to the use of the computer as a moderating and controlling device in instruction itself--uses which have only begun to be explored. Despite the progress which has been made in educational use of computers, we have much to do, especially in exploiting the potentials of integrated systems involving several branches and levels of government. (Author)

AD-615 715 Div. 23/4, 30/5
CFSTI Prices: HC$1.00 MF$0.50

System Development Corp., Santa Monica, Calif.
RESEARCH AND DEELOPMENT NEEDED IN SCHOOL INFORMATION SYSTEMS.
Professional paper,
by John G. Caffrey. 26 Apr 65, 11p
Paper no. SP-2049
Unclassified report

Descriptors: (*Education, Data processing systems), Personnel, Training, Systems engineering, Automation, Operations research.

The report summarizes recommendations for needed programs of research and development in educational data systems, as formulated by participants in a conference (sponsored by the U. S. Office of Education) held at Lake Arrowhead, California, in November 1963. The recommendations deal with needed personnel training, problems of compatibility, the need for clearinghouse services, applications of EDP technology to counseling and instruction, equipment, user-system interface, problems of installation, and criteria for the funding of R and D projects. (Author)

AD-615 716 Div. 23/4, 30/2
CFSTI Prices: HC$1.00 MF$0.50

System Development Corp., Santa Monica, Calif.
COMPUTERS AND THE TEACHING OF ENGINEERING MATHEMATICS.
Professional paper,
by Warren J. Pelton and John Staudhammer. 8 May 65, 11p Paper no. SP-2052/000/01
Unclassified report

Descriptors: (*Education, Engineering), (*Engineering, Education), (*Computers, Training devices), Mathematics, Instructors, Students, Programming (Computers).

The engineering community is very much aware of the rapid increase of scientific knowledge and technological applications. Because it is impossible to include all the new knowledge and technology in the engineering curriculum, a new look orrestructuring of the engineering curriculum is required. A substantial aid in helping the engineering educator restructure the curriculum is the modern computer. Efficient use of modern computers by instructors of engineering mathematics can eliminate much of the unnecessary rote or mechanical manipulation in many of the courses. Many new and unique computer programs will have to be written for each segment of the engineering curriculum. The faculty and students must be able to understand the use of the computer and be able to access these computer programs during normal classroom study. Computer applicability in individual classrooms will allow for the exploration of many more problems of a greater degree of sophistication and complexity than can be currently explored. This broader base of applied problems will afford the engineering student the opportunity to gain a greater depth of understanding and insight into the applications of modern engineering. (Author)

AD-615 717 Div. 23/4, 32/9
CFSTI Prices: HC$1.00 MF$0.50

System Development Corp., Santa Monica, Calif.
GREATER LOS ANGELES COMMUNITY-FOREIGN STUDENT RELATIONS.
Professional paper,
by Flournoy A. Coles, Jr. 13 May 65, 20p
Paper no. SP-2072/000/01 Unclassified report

Descriptors: (*Education, California), (*Foreign aid, Education), Urban areas, Population, Training, United States Government, Students, United States.

The document notes the major changes which have taken place in the foreign-student population in Greater Los Angeles over the past ten or so years, and underscores the implications of these changes with respect to the development of improved relationships between the community and these students. The major changes are (1) foreign students have become less a novelty and more an important element in the community, (2) the foreign-student population comes mainly from Africa, Asia and Latin American and is thus more visible than the European students of earlier post-war periods, (3) the current crop of foreign students come from cultures which are markedly different from the one they find here, (4) females constitute a larger proportion of the current foreign-student population, and (5) foreign students tend to be younger now than in the past. Based on these changes, the document concludes with a series of suggestions designed to effect a better relationship between the community and these foreign students--noting, however, some of the difficulties and obstacles pertinent thereto. (Author)

AD-615 718 Div. 32/3, 08/7, 30/2, 32/2
CFSTI Prices: HC$2.00 MF$0.50

System Development Corp., Santa Monica, Calif.
THE CONCEPTUAL FOUNDATIONS OF INFORMATION SYSTEMS.
Professional paper,
by H. Borko. 6 May 65, 37p Paper no. SP-2057
Unclassified report

Paper to be read at the symposium: The Foundations of Access to Knowledge to be held at Syracuse University, July 28-30, 1965.

Descriptors: (*Information retrieval, Systems engineering), (*Documentation, Systems engineering), Libraries, Statistical analysis, Reports, Subject indexing, Classification, Language, Analysis, Automation, Automatic.

Information systems consist of collections of recorded information, custodians who organize and maintain the collections, retrieval procedures and users. The conceptual foundations for these systems are derived from mathematics, engineering, behavioral science and the many other disciplines which together make up information science. The concepts are the theoretical formulations or principles concerning methods of storing, indexing, and retrieving information which are used in the design of information storage and retrieval systems. Seven concepts are enunciated. These deal with the need, equipment user responsiveness, language processing, indexing, classification and storage. The system design implications of each concept are discussed separately and then organized together to form an information storage and retrieval system of the future called BOLD. (Author) (Bibliographic on-Line Display)

AD-615 726 Div. 26/2, 18/5
CFSTI Prices: HC$4.00 MF$1.00

Oklahoma Univ., Norman. Dept. of Journalism.
AN EVALUATION OF THE CRITICISMS OF THE MILITARY'S PUBLIC RELATIONS PROGRAM.
Master's thesis,
by Jack F. Tolbert. 1965, 135p
Unclassified report

Descriptors: (*Armed forces (United States), Public

relations), (*Public relations, Armed forces(United States)), Industries, United States Government, Newspapers, Television stations, Motion pictures, Military personnel, Armed forces reserves.

Contents:
Military-industrial complex
Public information techniques
News manipulation
Security---a blessing or disguise
Congress and military public relations

AD-615 758 Div. 28/1, 30/2
CFSTI Prices: HC$3.00 MF$0.75

Laboratory of Aviation Psychology, Ohio State Univ. Research Foundation, Columbus.
THE INFLUENCE OF EXPERIENCE AND INPUT INFORMATION UPON POSTERIOR PROBABILITY ESTIMATION IN A SIMULATED THREAT-DIAGNOSIS SYSTEM.
Final rept. for 1 Oct 63-1 Jun 64,
by David A. Schum, Irwin L. Goldstein, and Jack F. Southard. Apr 65, 79p
Contract AF33 657 10763, Proj. 7184, Task 718403
AMRL TR-65-25

Unclassified report

Descriptors: (*Threat evaluation, Decision making), (*Decision making, Simulation), (*Performance (Human), Threat evaluation), (*Computers, Threat evaluation), Mathematical prediction, Human engineering, Psychology, Probability.

Two experiments are described in which posterior probability estimates made by humans are compared with similar estimates made by a computer using a modification of Bayes' theorem incorporating human estimates of P(D/H). The task was to estimate, on the basis of intelligence data from a simulated threat-evaluation situation, the likelihood of various alternative hypotheses that could account for the observed data. The purpose of the first experiment was to determine the effect of increased experience upon the human's ability to estimate posterior probabilities. The purpose of the second experiment was to compare human and automated posterior probability estimates under several levels of input data fidelity. It was predicted that, under low fidelity conditions, human posterior probability estimates would become increasingly inferior to automated solutions. This hypothesis was only partially confirmed. In both experiments, but particularly in the second, the humans provided higher posterior probability estimates than the certainty in the data justified. With respect to the desing of diagnostic systems, the present research tends to confirm the feasibility of automated Bayesian hypothesis-selection incorporating expert human estimates of the conditional probabilities P(D/H). (Author)

06. Biological and Medical Sciences

AD-615 197 Div. 16/1, 16/11

Army Research Inst. of Environmental Medicine, Natick, Mass.
EFFECTS OF SALICYLATE ON ACCLIMATIZATION TO WORK IN THE HEAT,
by David E. Bass and Eugene D. Jacobson. 15 Jun 64, 4p

Unclassified report

Pub. in Journal of Applied Physiology v20 n1 p70-2 Jan 1965
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Acclimatization, Salicylates), (*Salicylates, Acclimatization), Heat tolerance, Sodium compounds, Drugs, Body temperature, Exercise, Simulation, Deserts, Jungles, Humans.

Some effects of daily large doses of sodium salicylate were studied on the pattern of acclimatization to work in the heat. Acclimatization was induced by daily walks of 100 min on a level treadmill at 3.5 mph at 120/80 F (dry bulb/wet bulb). Two matched groups of six men each were acclimatized in this manner and one group received 5.9-7.8 g of sodium salicylate daily over a period of 10 days. Men treated with salicylate exhibited the same qualitative responses as the control group in terms of the acclimatization process, i.e., their rectal temperatures, skin temperatures, and pulse rates during work in the heat were lower on the later days. Quantitatively, the degree of acclimatization (as measured by rectal temperature) was less in the men receiving salicylate than in the control group. This difference was more apparent than real, however, in that when the salicylate group were taken off the drug regimen, they exhibited the same degree of acclimatization in terms of rectal temperature as did the control group. The acclimatization process did not abolish the acute response to salicylate. (Author)

AD-615 208 Div. 16/1

University of Western Ontario, London.
THE TAIL OF THE RAT, IN TEMPERATURE REGULATION AND ACCLIMATIZATION,
by R. P. Rand, A. C. Burton, and T. Ing.
28 Aug 64, 11p

Unclassified report

Pub. in Canadian Journal of Physiology and Pharmacology v43 p257-67 1965
(Copies available only to DDC users).

Descriptors: (*Rats, Acclimatization), (*Acclimatization, Rats), Temperature, Blood, Skin, Canada.

The role of the tail of the Wistar white rat in its temperature regulation was studied, and a new index of acclimatization was found. Blood flow in the tail was measured by venous-occlusion plethysmography at environmental temperatures from 17 to 33C. There is an abrupt vasodilation between 27 and 30 degrees with flow rising from less than 5 ml to about 40 ml/100 ml tissue per minute. Measurement of heat loss by a gradient calorimeter on the tail showed a similar reflex vasodilation at a critical vasodilation temperature (T(cvd)). After vasodilation the tail can lose up to 20% of the total heat production of the rat. The skin temperature of the tail was used as an index of vasodilation to determine whether the critical temperature shifted with acclimatization to 11C, 20C, and 30C. There is a decrease in T(cvd) of about 6 degrees after acclimatization to cold. After acclimatization to 30C, no vasodilation was found at temperatures up to 33C. The maximum heat loss of the tail is greatly increased after cold acclimatization. The mechanism of the shift is probably a change in sensitivity of thermal receptors on the tail, due to an increased vascularity (increased thermal conductivity) of the local tissues. (Author)

AD-615 216 Div. 16/8
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech., Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
BIOELECTRIC CONTROL IN MEDICINE,
by V. S. Gurfinkel. 29 Apr 65, 12p FTD-TT-64-1019
TT 65-62216

Unclassified report

Unedited rough draft trans. of Akademiya Meditsinskikh Nauk SSR. Vestnik v19 n2 p33-8 1964.

Descriptors: (*Medical equipment, Electrical equipment), (*Electrical equipment, Medical equipment), Biology, Electrocardiography, Electroencephatography, Prosthetics, Musculoskeletal system, Medicine, USSR.

A review is given of the instruments and devices used for medical investigation, diagnosis, and therapeutics that have bioelectric potentials as control signals. Electrocardiography, electroencephalography, and prosthetic and orthopedic instruments used with skeletal muscles are examples.

AD-615 234 Div. 16/1
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ACUTE DISRUPTIONS OF THE DIURNAL RHYTHM OF VITAL FUNCTIONS AND THEIR EFFECT ON PROFESSIONAL EFFICIENCY OF HUMANS,
by L. A. Veidner-Dubrovin and N. A. Matyushkina.
20 Apr 65, 14p FTD-TT-64-1188
TT 65-62234

Unclassified report

Unedited rough draft trans. of Voprosy Psikhologii (USSR) v10 n4 p61-8 1964.

Descriptors: (*Rhythm (Biology), Performance (Human)), (*Performance (Human), Fatigue (Physiology)), (*Fatigue (Physiology)), Performance (Human)), Diurnal variations, Labor, Medical examination, Sleep, Relaxation (Physiology), Stimulation, Motor reactions, Conditioned reflex, USSR.

Fatigue of a human being and the consequence of it, reduction in professional efficiency, under the effect of acute disruption of the diurnal rhythm and of vital functions, appeared with an increase in time. Execution of professional functions and an increased instability of individual characteristics in executing these tasks also occurred. Maximum instability of individual characteristics (in comparison with initial data obtained under ordinary conditions), was observed during the execution of professional function and actions based on finely coordinated motorial activity. Fewer changes were observed when the individuals executed rapid actions connected with shifting of body in space. (Author)

AD-615 235 Div. 20/6
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SCIENTIFIC INDUSTRIAL CONFERENCE ON RADIATION HYGIENE (NO. 3) LENINGRAD, 16-20 APR 63,
by Yu. K. Kudritskii and K. K. Poplavskii.
21 Apr 65, 19p FTD-TT-64-1190
TT 65-62235
Unclassified report

Unedited rough draft trans. of Meditsinskaya Radiologiya (USSR) v9 n3 p84-9 1964.

Descriptors: (*Health physics, Symposia), Reports, Shielding, Dosimeters, Radiological contamination, USSR.

Preceeding of the Third Scientific Industrial Conference on Radiation Hygiene of the USSR are presented.

AD-615 271 Div. 30/2, 16/7
CFSTI Prices: HC$2.00 MF$0.50

Harry Diamond Labs., Washington, D. C.
ELECTRONIC ANALOG SIMULATION OF THE MAMMALIAN CARDIOVASCULAR SYSTEM.
Progress rept.,
by Edward A. Wright and William C. Burton.
25 Feb 65, 27p Rept. no. TM-65-2
Projs. 31100, 1P010501A001
Unclassified report

Descriptors: (*Bionics, Cardiovascular system), (*Cardiovascular system, Simulation), Mammals, Models (Simulation), Analog computers, Mechanical organs, Circuits, Control panels, Display systems, Scaling circuits.

The report is the second in a series that describes work done to simulate the mammalian cardiovascular system using electronic analog computer techniques (See also AD-423 288). Development and evaluation of a second computer model is presented. The second model, like the first, simulates the function of the left ventricle and the systemic circulation; however, the systemic vascular system is assumed to be a two- instead of a three-element impedance. In addition, an aortic pressoreceptor reflex is incorporated to provide elementary control logic for the system. By means of this reflex, the single-chambered heart is directed to pump automatically when the aortic pressure reaches a predetermined minimum, and the rate at which fluid is pumped from the heart is correspondingly adjusted so that the aortic pressure pulse will peak precisely at a specified maximum. These changes make the second model more realistic than the first; however, lack of quantitative data regarding the cardiovascular system compromises its accuracy. It nontheless gives an insight into the value of systems analysis of physiological systems using computer techniques. (Author)

AD-615 283 Div. 16/10
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
IMPORTANCE OF ORTHOSTATIC DISTURBANCE IN RABBITS SUBJECTED TO TOTAL X-RAY RADIATION,
by P. V. Sipovskii and L. V. Funshtein. 28 Apr 65,
5p FTD-TT-65-53
TT 65-62271 Unclassified report

Unedited rough draft trans. of Meditsinskaya Radiologiya (USSR) v4 n3 p80-1 1959.

Descriptors: (*X rays, Cardiovascular system), (*Cardiovascular system, X rays), (*Blood circulation, X rays), Blood volume, Posture, Radiobiology, Radiological dosage, Pathology, Rabbits, USSR.

In a definite combination the effects of radiation and orthostatic disturbance of the blood circulation are capable of mutally reinforcing the biological effect of each of these factors and bringing about the early occurrence of death. The load on the cardiovascular system from the orthostatic position, in addition to the action of the radiation, leads to its functional incapacitance with untimely and even unexpected death of radiated rabbits for which sublethal doses of radiation take on the significance of fatal doses which act so lethally that death sets in after 3 and 1/2 hours post-radiation.

AD-615 298 Div. 16/11, 16/10
CFSTI Prices: HC$1.00 MF$0.50

New York State Univ., Buffalo. School of Medicine.
EFFECT OF CARBON DIOXIDE EXPOSURE ON ELECTROLYTE DISTRIBUTION AND ITS RELATIONSHIP TO CONVULSIVE ACTIVITY IN RATS,
by H. W. Gillen and P. T. Hsu Cheng. 30 Jan 65,
18p Technical rept. no. TR-64-2
Contracts Nonr96904, Nonr434300
Unclassified report

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Descriptors: (*Carbon dioxide, Electrolytes (Physiology)), (*Electrolytes (Physiology), Carbon dioxide), (*Convulsive disorders, Carbon dioxide), Toxicity, Exposure, Cerebral cortex, Stress (Physiology), Blood plasma, Acidosis, Barbiturates, Electroencephalography, Electrocardiography.

The effect of exposure of rats to 35% CO2 - 65% 02 for periods of 5, 7, 10, 15, and 30 minutes and of recovery for 30 and 60 minutes after 30 minute exposure on electrolyte distribution and its relationship to seizure activity in unanesthetized rats was studied. Significant changes were observed 5 min. after exposure and 30 min. after recovery. Seizure activity was observed in about 50% of the exposed rats after 2-10 min. exposure and lasted about 5 sec. The recovery seizure, through rarer, came sooner, lasted longer, and was more violent; only about 5% of the exposed rats displayed a withdrawal seizure, 1/2 to 1 and 1/2 min. after withdrawal. With CO2 exposure, there were increases of Na and water and decreases of K and Cl in plasma in unanesthetized rats. There were decreases of K, Na and Cl in cerebral cortex. With withdrawal in air and relative to the exposure period, the changes were all reversed, with the exception of cortex Cl which continued to drop during withdrawal. Like systemic stress, severe physical stress (blow on the head) may have increased plasma K (5.63 mEg/L) while in rats anesthetized with Na pentobarbital the average plasma K value was 4.2 mEg/L. (Author)

AD-615 299 Div. 16/1
CFSTI Prices: HC$2.00 MF$0.50

Geoscience, Ltd., La Jolla, Calif.
THERMAL AND ELECTRICAL CONDUCTIVITIES OF BIOLOGICAL FLUIDS AND TISSUES.
Annual rept. for 1 Apr 64-31 Mar 65,
by H. F. Poppendiek, N. D. Greene, J. E. Chambers,

L. V. Feigenbutz, and P. M. Morehouse. 31 Mar 65, 40p GLR-34
Contract Nonr409500

Unclassified report

Descriptors: (*Erythrocytes, Damage), (*Body fluids, Thermal conductivity), (*Electrical conductance, Body fluids), Tissues, (Biology), Blood, Blood plasma, Freezing, Cryogenics, Stresses (Physiology), Biophysics, Biology, Humans, Bovines, Lungs, Liver, Kidneys, Brain, Bone marrow.

Experimental electrical conductivities of human gastric juices, urine and bovine aqueous and vitreous humours were determined. Special cells for the determination of electrical conductivities for tissues has been designed, constructed, and tested. Experimental measurements of theelectrical conductivity of bovine blood were determined as a function of hemolysis. Changes in the electrical conductivity of hemolyzed blood have been related to erythrocyte damage. A modified thermal conductivity apparatus was used to measure the conductivities of bovine lung, liver, kidney, brain, bone marrow, and aqueous and vitreous humour, and chicken skin. The correlations between thermal conductivity and physical properties of biological tissues and fluids were studied. Investigations of the effect of freezing bovine liver in liquid nitrogen on thermal conductivity have been conducted. The techniques of freezing blood in liquid nitrogen have been examined also. Cryogenically frozen and stored blood samples from the Presbyterian Medical Center in San Francisco were thawed and electrical and thermal conductivity measurements were made and the results analyzed. (Author)

AD-615 304 Div. 16/4
CFSTI Prices: HC$1.00 MF$0.50

Tennessee Univ., Knoxville.
STUDIES CONCERNING LONGEVITY, AGING AND PRODUCTIVITY IN AEDES AEGYPTI (L).
Quarter technical rept. no. 1, 1 Nov 64-31 Jan 65,
by James N. Liles. 31 Jan 65, 3p
Contract DA18 064AMC48A

Unclassified report

Descriptors: (*Aedes, Aging (Physiology)), Life span, Amino acids, Labeled substances, Culicidae, Females.

AD-615 334 Div. 16/10, 16/11, 16/13
CFSTI Prices: HC$7.60 MF$2.25

Geophysical Inst., Univ. of Alaska, College.
PROCEEDINGS, SYMPOSIA ON ARCTIC BIOLOGY AND MEDICINE. IV. FROSTBITE,
ed. by Eleanor G. Viereck. 1964, 460p

Unclassified report

Symposium held at the Arctic Aeromedical Lab., Fort Wainwright, Alaska, 17-19 Feb 64.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Frostbite, Symposia), Arctic regions, Freezing, Tissues (Biology), Wounds and injuries, Pathology, Cold weather tests, Medicine, Therapy, Diagnosis, Drugs, Dextran, Surgery.

Contents: Mechanism of freezing injury in clinical frostbite; Experimental injuries produced by prolonged exposure to cold; Studies on the pathogenesis of cold injury microcirculatory changes in tissue injured by freezing; Atmospheric cooling and the occurrence of frostbite in exposed skin; Prevention of frostbite and freezing; Frostbite: A method of management; Clinical aspects of frostbite injury; Prevention and treatment of frostbite in mountain warfare; Cold injury among civilians; Policy for treatment of frostbite in Norway; General outcooling and local frostbite; Effects of drugs in the treatment of frostbite; Low molecular weight dextran. A new agent in the treatment of experimental frostbite; Sympathectomy in the treatment of frostbite; Sequelae to cold injury in 100 patients.

AD-615 371 Div. 16/1

School of Aerospace Medicine, Brooks AFB, Tex.
EFFECTS OF FOUR WEEKS OF ABSOLUTE BED REST ON CIRCULATORY FUNCTIONS IN MAN.
Rept. for Feb-May 64,
by Perry B. Miller, Lawrence E. Lamb, and Robert L. Johnson. 1964, 10p SAM-TR-65-209

Unclassified report

Pub. in Aerospace Medicine v35 n12 p1194-200 Dec 1964. (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Relaxation (Physiology), Blood circulation), (*Cardiovascular system, Relaxation (Physiology)), Space flight, Tolerances (Physiology), Space medicine, Posture, Pressure suits, Acceleration tolerance, Blood volume, Blood plasma, Erythrocytes, Pulse rate, Heart, Cannulation, Tests.

Various effects of 4 weeks of absolute bed rest on the circulatory system were studied in 12 healthy male volunteers. Postural tolerance varied from day to day before and after bed rest. Repeated tilt table testing allowed a more accurate appraisal of changes in postural tolerance caused by bed rest. Postural syncope on the tilt table was more frequent after bed rest. Forty-two percent of the subjects, however, did not faint during repeated testing after bed rest. A comparison of the highest orthostatic heart rates recorded during each tilt table test without an antigravity suit before and after bed rest showed a distinctly higher range of orthostatic heart rates after bed rest in each subject studied. When an antigravity suit was worn during tilt table testing after bed rest, postural syncope occurred on one occasion only. The relation of these studies to proposed flights in the Manned Orbiting Laboratory is discussed. (Author)

AD-615 372 Div. 16/1

School of Aerospace Medicine, Brooks AFB, Tex.
MODIFICATION OF THE EFFECTS OF TWO WEEKS OF BED REST UPON CIRCULATORY FUNCTIONS IN MAN.
Rept. for Jul 62-Jan 64,
by Perry B. Miller, Bryce O. Hartman, and Robert L. Johnson. 1964, 11p SAM-TR-65-204

Unclassified report

Pub. in Aerospace Medicine v35 n10 p931-9 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Relaxation (Physiology), Blood circulation), (*Cardiovascular system, Relaxation (Physiology)), Space flight, Tolerances (Physiology), Posture, Pressure suits, Blood volume, Blood plasma, Body weight, Hematology, Hematocrit, Hemoglobin, Heart, Pulse rate, Acceleration tolerance, Space medicine.

The effects of 2 weeks of bed rest on circulatory functions were studied in 72 healthy subjects, utilizing two different intervals of 2 weeks' bed rest. The value of various procedures in maintaining normal cardiovascular

reflex regulatory mechanisms during bed rest was evaluated. A 15-fold increase in syncopal reactions and a significant increase in orthostatic heart rate occurred after 2 weeks of bed rest. Physical activity and tilt table training for 4 weeks between the two bed rest periods resulted in a decrease of the resting heart rate and an improvement in orthostatic tolerance. An improvement in orthostatic tolerance after bed rest was noted with the various prophylactic procedures utilized in this study. A program consisting of exercise and tilt table training before bed rest and intermittent venous occlusion in the extremities during bed rest in a 10-degree head-up bed resulted in almost complete preservation of normal orthostatic tolerance. Various in-bed procedures tended to prevent hematological changes previously noted with simple bed rest. An antigravity suit proved very effective in preventing postural syncope after bed rest. (Author)

AD-615 373 Div. 16/1

School of Aerospace Medicine, Brooks AFB, Tex.
ION TRANSPORT IN ISOLATED RABBIT ILEUM. III. CHLORIDE FLUXES.
Rept. for 15 Feb-18 May 64,
by Stanley G. Schultz, Ralph Zalusky, and Arthur E. Gass, Jr. 18 May 64, 6p SAM-TR-65-207
Unclassified report

Pub. in the Journal of General Physiology v48 n2 p375-8 Nov 1964.
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Electrolytes (Physiology), Intestines), (*Ion exchange, Electrolytes (Physiology)), Tissues (Biology), Ions, Sodium, Chlorine, Conductivity, Transport properties, Electrochemistry, Rabbits.

Unidirectional Cl fluxes across in vitro segments of rabbit ileum have been determined both in the absence and in the presence of an electrochemical potential gradient. The results indicate that Cl transport in this preparation can be attributed to purely passive forces uninfluenced by solvent drag or exchange diffusion. Furthermore, on the basis of this and previous studies, it has been demonstrated that the sum of the partial ionic conductances of Na and Cl accounts for at least 90 per cent of the total tissue conductance. (Author)

AD-615 374 Div. 16/1

School of Aerospace Medicine, Brooks AFB, Tex.
TOLERANCE TO TRANSVERSE (+Gx) AND HEADWARD (+Gz) ACCELERATION AFTER PROLONGED BED REST,
by Perry B. Miller and Sidney D. Leverett, Jr.
1963, 4p
Unclassified report

Pub. in Aerospace Medicine v36 n1 p13-5 Jan 1965
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Acceleration tolerance, Astronauts), (*Relaxation (Physiology), Acceleration tolerance), Reflexes, Heart, Pulse rate, Vision, Pathology, Electrocardiography, Space medicine, Space flight, Atmosphere entry, Simulation.

Tolerance to the transverse (+Gx) acceleration of a simulated Gemini re-entry profile was determined before and after 4 weeks of absolute bed rest. Tolerance to headward (+Gz) acceleration was studied before and after 4 weeks of absolute bed rest and 2 weeks of modified bed rest. As judged by the degree of physical discomfort, the ability to respond to a central light, or the presence of electrocardiographic abnormalities, tolerance to +Gx was unaffected by 4 weeks of absolute bed rest. In each subject studied, heart rates during peak acceleration were higher after bed rest than before. As judged by the level of acceleration at which central vision was lost, no significant change in tolerance to headward (+Gz) acceleration of rapid onset was observed after 2 weeks of modified bed rest or after 4 weeks of absolute bed rest. After each type of bed rest, the majority of the subjects had decreased tolerance to headward (+Gz) acceleration of gradual onset, but the mean decrease was not statistically significant. Mean heart rates at equivalent levels of +Gz were significantly higher after both periods of bed rests. The only arrhythmia of clinical importance noted was the appearance of bursts of premature atrial contractions during G.O.R. + Gz in 1 subject after 2 weeks of bed rest. (Author)

AD-615 381 Div. 16/2

School of Aerospace Medicine, Brooks AFB, Tex.
MEDIUM FOR DIFFERENTIATING THE GRAM-NEGATIVE, NONFERMENTING BACILLI OF MEDICAL INTEREST,
by Walter Sellers. 1 Aug 63, 5p
Unclassified report

Pub. in Journal of Bacteriology v87 n1 p46-8 Jan 1964
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Bacillus, Identification), (*Culture media, Bacillus), Ph, Nitrates, Nitrites, Nitrogen, Fluorescence, Oxidation, Pseudomonas aeroginosa, Vibrio, Bacteria.

An agar-slant medium is described for differentiating gram-negative, nonfermenting bacilli of medical interest. Differencesin the ability of bacilli to grow anaerobically in the presence of nitrate, to produce pH changes, to produce N2 from nitrite and nitrate (singly and in combination), to fluoresce, andto oxidize a drop of glucose solution to acid in the presence of high peptone concentrations were used in the development of the medium. Organisms differentiated by the medium include Pseudomonas aeruginosa, Bacterium anitratum, Mima polymorpha, and Vibrio alcaligenes or Alcaligenes faecalis. (Author)

AD-615 432 Div. 16/1, 04/3, 16/2, 16/3, 16/4, 16/10
CFSTI Prices: HC$3.00 MF$0.75

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
NEWS OF THE ACADEMY OF SCIENCES OF THE USSR. BIOLOGICAL SERIES, 1964, VOL. 29, NO. 3: SELECTED ARTICLES.
31 Mar 65, 58p FTD-TT-65-40
TT 65-62288
Unclassified report

Unedited rough draft trans. of Akademiya NaukSSSR. Izvestiya. Seriya Biologicheskaya v29 n3 p352-68, 482-9 1964.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Biology, USSR), (*Scientific research, USSR), (*Space medicine, USSR), Weightlessness, Blood circulation, Cardiovascular system, Physiology, Blood pressure, Hematology, Stress (Physiology), Electrocardiography, Biochemistry, Biophysics, Microbiology, Organic compounds, Agriculture, Plants (Botany).

Contents:
Blood Circulation Under The Conditions of Weightlessness
Biological Research at The Annual Convention of The Divisions Of The Academy Of Sciences USSR.

AD-615 437 Div. 30/2, 28/1, 28/3
CFSTI Prices: HC$1.00 MF$0.50

Georgia Univ., Athens. Bioelectronic Computer Lab.
DIGITAL RECORDING AND ANALYSIS OF PSYCHOPHYSIOLOGIC EXPERIMENTS,
by Herbert Zimmer. 1963, 20p
Grant AF AFOSR257 63
AFOSR 65-0578

Unclassified report

Descriptors: (*Psychophysiology, Digital computers), (*Digital computers, Psychophysiology), Autonomic nervous system, Reaction (Psychology), Reflexes, Pain, Perception (Psychology), Anxiety, Emotions, Galvanic skin response, Pulse rate, Blood circulation, Respiration, Muscles, Motion, Analog-to-digital converters, Word association, Conditioned reflex, Statistical analysis, Psychometrics.

A data collection system for the recording of autonomic nervous system variables was constructed in order to facilitate data reduction for a number of experiments in which autonomic nervous system reactions are of interest as the dependent variables. This system is employed in experiments on pain perception, feedback of emotional reactions, the subject's facilitation or inhibition of his autonomic reactions by self-initiated signals, and the conditioning of autonomic nervous system reactions to critical symbols and their generalization to related symbols. Continuous samplings of seven data channels are being recorded in seven-channel IBM format on digital magnetic tape: (a) reaction time, (b) skin conductance, (c) heartrate, (d) digital blood flow, (e) respiration, (f) muscle action potential, and (g) body movement. (Author)

AD-615 463 Div. 32/1, 04/3

Agricultural Research Service, Beltsville, Md.
RESEARCH IN PLANT TRANSPIRATION: 1962,
by James E. Pallas, Jr., Anson R. Bertrand, Donald G. Harris, Charles B. Elkins, Jr., and Clyde L. Parks. Mar 65, 58p Production Research rept. no. PRS-87

Unclassified report

Available from Superintendent of Documents, GPO, Washington, D. C., 20402, $0.45, as A1.84:87.

Descriptors: (*Plants (Botany), Evapotranspiration), Controlled atmospheres, Growth, Soils, Photosynthesis, Corn, Cereals, Osmotic pressure, Polyethylene plastics, Plastics, Mercury compounds, Fluorides, Aromatic compounds, Acetates, Sulfonates, Moisture, Humidity.

Experiments were conducted to measure plant transpiration in a controlled environment growth room. Radiant energy, relative humidity, and soil moisture tension had marked effects on the transpiration rate. Guard cell operation was measurably affected by moisture availability. Osmotic pressure determinations made concurrently with stomatal observations showed that, with the species studied, operation of stomata could not be correlated with changes in osmotic pressure of the guard cells. Tests were made of several formulations applied to leaves to provide either a physical barrier to transpiration or a potential control of stomatal operation. Materials included latex and plastic compounds, waxes, mercury and fluoride compounds, and alpha-hydroxysulfonates. Although a number of these formulations reduced transpiration, few did so without also depressing plant growth. In experiments with the most effective transpiration suppressants, treated leaves developed a temperature differential of 6 to 10C. over that of untreated leaves. (Author)

AD-615 467 Div. 29/4
CFSTI Prices: HC$4.00 MF$1.00

FMC Corp., Santa Clara, Calif. Central Engineering Labs.
AUTOMATED SCULLERY. PHASE II. DEVELOPMENT OF CONCEPTS.
Central Engineering rept.
31 Oct 63, 131p Rept. no. R-1914A
Proj. 69857

Unclassified report

Descriptors: (*Automation, Kitchen equipment and supplies), (*Kitchen equipment and supplies, Naval equipment), Automation, Cleaning, Cleaning compounds, Electrical equipment, Sprays, Mechanical drawings, Tests.

The report contains the following sections: The Summary outlines the most important project developments, including the work performed, recommended machine concepts, and other conclusions derived from the Phase II program. The section on the 'Development Study of the Mess Gear Cleaning Area' gives the results of the investigation of the high-velocity spray approach to the cleaning of mess gear, including the jury-rig experimentation and the resultant proposed mess gear cleaning operation suggested by the success of these experiments. 'Handling and Transport of Mess Gear and Gross Soil' describes the processing functions which take place from the input to the output of the machine. In this section, proposed concepts, with their possible alternatives, are presented along with drawings and brief evaluations of their effectiveness. In the section on 'Automated Scullery Configuration and Design Factors,' the machine arrangement and the various important auxiliary design factors are presented for consideration. The section on 'Machine Evaluations and Cost Estimate of the Automated Scullery' discusses the factors which are relevant to an evaluation of the various machine areas and offers a preliminary evaluation of these areas and the overall machine. In addition, the unit cost of the scullery is given in a preliminary estimate of production units.

AD-615 469 Div. 16/10, 25/4

Zaret Foundation, Inc., Scarsdale, N. Y.
EFFECTS OF ELECTROMAGNETIC RADIATION ON BIOLOGICAL SYSTEMS.
Annual progress rept. for 15 Jun 64-1 Apr 65,
by Milton M. Zaret. 10 Apr 65, 4p
Grant DA MD49 193 64G136

Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Electromagnetic waves, Radiobiology), (*Radiobiology, Electromagnetic waves), (*Lasers, Radiobiology), Retina, Eye, Rabbits, Vision, Visual acuity, Ophthalmology, Electroencephalography, Damage, Tissues (Biology), Adaptation (Physiology), Neodymium, Ultraviolet radiation, Fluorescence.

Contents: Neodymium laser irradiation of rabbit eye; Effects of laser radiation on visual function; Electroretinogram and cortical evoked response; Ocular fluorescence with ultraviolet light.

AD-615 472 Div. 16/10, 25/4
CFSTI Prices: HC$1.00 MF$0.50

Pennsylvania Univ., Philadelphia.

PHYSIOLOGICAL EFFECTS OF HEATING THE SKIN WITH MICROWAVE AND INFRARED RADIATION.
Final rept.,
by James D. Hardy. 11 Jan 61, 4p
Contract Nonr55112, Proj. NR114 257

Unclassified report

Descriptors: (*Electromagnetic waves, Radiobiology), (*Microwaves, Radiobiology), (*Infrared radiation, Radiobiology), (*Radiobiology, Skin), Pathology, Optical properties, Thermal properties, Pain, Temperature, Thresholds (Physiology), Burns, Healing.

Research was conducted to elucidate the optical and thermal properties of human and animal skin. Spectrophometric measurements were made in the spectral region from 0.4 to 20 microns for white, pigmented human skin and for animal skin. Thermal measurements were also necessary to determine the thermal diffusion and thermal inertia of the skin. These studies were followed by the analysis of the effects of radiation to producing pain sensation, temperature sensation and thermal burns. From theoretical considerations, it was deduced that the temperature of the burn area following influction on the burn was important in regard to pain, healing time and burn development. It would appear that these results have practical application in the problem of man's treatment of burns as well as in the hospital treatment of mild burns. Studies have also been carried out in respect to the heating of the skin by 3 cm and 10 cm microwave radiation. These results appear to have practical application in the problem of radiation safety to Navy personnel operating radar equipment. A bibliography of progress reports and scientific publications containing detailed descriptions of the experiments along with analyses of the results is presented. (Author)

AD-615 475 Div. 29/4
CFSTI Prices: HC$6.00 MF$1.25

FMC Corp., Santa Clara, Calif. Central Engineering Labs.
AUTOMATED SCULLERY. PHASE I. COMPONENT AVAILABILITY STUDY.
Central Engineering rept.
21 Jun 63, 219p Rept. no. R-1837A
Proj. 69826

Unclassified report

Descriptors: (*Automation, Kitchen equipment and supplies), (*Kitchen equipment and supplies, Naval equipment), Cleaning, Cleaning compounds, Electrical equipment, Conveyors, Fans, Blowers, Ultrasonic radiation, Brushes.

The automated scullery is a new machine development capable of accepting and processing unsorted and unscraped messgear in a tray such that all items of messgear will be washed, dried, sterilized, sorted and stored without benefit of manual assistance except for load and unload functions. The report completes the scope of work for Phase I which calls for a study of the availability of commercially available mechanical, electrical, and chemical components which may be applicable to the automated scullery proposed.

AD-615 476 Div. 16/4, 28/3
CFSTI Prices: HC$1.00 MF$0.50

Oxford Univ. (England).
BRAIN STEM STIMULATION AND ETHOLOGICAL STUDIES ON BIRDS.
Final scientific rept. for 1 Jan 64-1 Jan 65,
by N. Tinbergen, D. M. Vowles, and J. D. Delius.
31 Jan 65, 10p
Grant AF EOAR64 2
AFOSR 65-0666

Unclassified report

Descriptors: (*Birds, Behavior), Brain, Stimulation, Physiology, Adaptation (Physiology), Ecology, Thresholds (Physiology), Reproduction (Physiology), Relaxation (Physiology), Posture, Motion, Food.

The work was specifically intended to elucidate further the physiological mechanisms of some particular types of behavior in birds using in combination brain stimulation and observation techniques. Studies were made of the interactions between internal and external stimulation and of the interactions occurring during simultaneous stimulation of two different areas of the brain, which yield either similar or differing types of behavior. The experimental animals have chosen for this work were HeringGulls, whose behavior is simpler, i.e. more stereotyped, than that of the classically studied mammals.

AD-615 477 Div. 16/10, 25/4, 25/8
CFSTI Prices: HC$2.00 MF$0.50

John B. Pierce Foundation of Connecticut, New Haven.
SKIN AND SUBCUTANEOUS TEMPERATURE CHANGES DURING EXPOSURE TO INTENSE THERMAL RADIATION,
by J. A. J. Stolwijk and J. D. Hardy. Oct 64, 33p
Contract DA49 146XZ124
DASA 1566

Unclassified report

Descriptors: (*Thermal radiation, Skin), (*Skin, Radiobiology), Temperature, Exposure, Burns, Radiometers, Quartz, Infrared radiation, Reflection, Optical properties, Thermal properties, Adaptation (Physiology), Absorption, Scattering.

Radiometric measurements have been made of the skin temperature changes occurring during irradiation of the body by high intensity thermal radiation with square wave pulses. Quartz lamps operated at 50% overvoltage provided a source of color temperature 2650K and a uniform (±5%) irradiance of 0.15 gm cal/sec/square cm over areas of 40x30cm. A spring operated focal-plane shutter controlled exposure times from 2-120 seconds with a rise time of 0.01 seconds. The radiometer, mounted between the quartz lamps so as to view the skin from normal incidence, had a 96% response time of 0.1 seconds and a precision of ±0.1C. Significant corrections were necessary to allow for the far infrared reflection from the human skin; a reflectivity of 1.5% was measured for the white skin in the spectral region 3.7 microns to 30 microns. The experimental values of skin temperature rise during irradiation were compared with those calculated by the finite differences method for various skin layers with the best available values for optical and thermal properties of each skin layer, using an analog computer. During the initial 10-15 sec of irradiation theoretical and experimental values are in agreement, indicating passive responses. For longer exposures, it is concluded that physiological responses such as vasodilation and sweating slow the skin temperature rise. Subcutaneous temperatures can be calculated from surface temperature data; it is indicated that most of the radiation is absorbed in the first 0.05 - 0.15 mm of skin through combined effects of absorption and scattering. (Author)

AD-615 478 Div. 16/1
CFSTI Prices: HC$2.00 MF$0.50

John B. Pierce Foundation of Connecticut, New Haven.
SKIN TEMPERATURE AND CUTANEOUS PAIN DURING WARM WATER IMMERSION,

by J. D. Hardy, J. A. J. Stolwijk, H. T. Hammel, and D. Murgatroyd. Oct 64, 37p
Contract DA49 146XZ124; Grant PHS GM10289
DASA 1567

Unclassified report

Prepared in cooperation with Yale Univ., New Haven, Conn. School of Medicine.

Descriptors: (*Skin, Heat tolerance), (*Heat tolerance, Pain), Water, Temperature, Thermal properties, Adaptation (Physiology), Nerve fibers, Thermochemistry, Thermal conductivity, Heat transfer, Thresholds (Physiology).

Measurements of skin temperature were made during the sudden immersion of the skin of human subjects in water baths at 36-41C and related to the reports of pain elicited during the first few seconds of immersion. Within 0.5 seconds, the skin temperature rose to bath temperature and remained at this level during the 10-15 seconds of immersion, pain was reported at 37-41C occurring 1-5 seconds after the start of the immersion and adapting in 2-6 seconds. Calculation of the subcutaneous temperature and thermal gradients indicate maximal thermal gradients in superficial skin layers during the first 0.1 - 0.2 seconds of immersion (60C/mm) decreasing rapidly during the first 5 seconds to 6C/mm. Analysis of the transient pain indicated that it could be considered as the more sensitive 'phasic' response of the pain ending of which the 'static' unadapting response occurs at skin temperatures of 43-46C. Several alternative explanations including subcutaneous thermal gradients, vasomotor reactions, and thermo-chemical changes in the nerve membrane were considered as possible explanations. The last most likely possibility requires a second order kinetic system with highly temperature sensitive reaction velocities to account for both the phasic and static components of the pain. (Author)

AD-615 479 Div. 16/1, 16/10
CFSTI Prices: HC$3.00 MF$0.75

John B. Pierce Foundation of Connecticut, New Haven.
SPATIAL SUMMATION OF PAIN FOR LARGE BODY AREAS,
by D. Murgatroyd. Oct 64, 53p
Contract DA49 146XZ124
DASA 1568

Unclassified report

Descriptors: (*Infrared radiation, Pain), (*Pain, Thresholds (Physiology)), Body, Face, Skin, Thorax, Temperature, Heat tolerance, Quartz, Radiometers, Exposure.

Spatial summation of pain was investigated using high intensity infra-red radiation. Cutaneous pain thresholds were determined for a total of eight subjects using apertures ranging from 1 sq. cm to 200 sq. cm on the face area, and 10 sq. cm to 1500 sq. cm for large body areas. Two methods of determining threshold - reaction time and method of constant stimuli - were utilized. Skin temperature at threshold was determined by a radiometric measuring device especially designed for use during skin heating with infrared quartz lamps. Values so determined were checked by a computer solution of skin temperature rise using the best available data on the optical and thermal properties of the skin and found to be in close agreement. Results indicate that final skin temperature at threshold varied from 39.3C to 46.7C depending on subject, size of aperture, and area of body irradiated. A significant lowering of final skin temperature at threshold for the larger area occurred for all subjects when comparing apertures 1 sq. cm and 3 sq cm on forehead and face areas, and apertures 10 sq. cm and 40 sq. cm on chest and back. A slight decrease in final skin temperature at threshold was generally noted for aperture sizes 5 sq. cm and 200 sq. cm on face areas but was not consistent for all subjects. When 40 sq. cm apertures were compared with full back and chest exposures, a higher threshold for the very large areas was obtained for three of the four subjects used. (Author)

AD-615 485 Div. 16/10, 16/1, 16/3
CFSTI Prices: HC$2.00 MF$0.50

Medical Coll. of Virginia, Richmond. Surgical Research Labs.
STUDIES OF BURN SKIN PROTEIN IMMUNOELECTROPHORETIC ANALYSIS OF PROTEINS EXTRACTED FROM BURNED SKIN,
by M. S. Rittenbury. Apr 65, 26p
Contract XZ045C2003 76, Proj. 4c03 033
DASA 1634

Unclassified report

Descriptors: (*Burns, Proteins), Electrophoresis, Skin, Tissues (Biology), Wounds, and injuries, Histological techniques, Antigens and antibodies, Immunology, Pathology, Bacteria, Therapy.

The manifest seriousness of deep thermal skin injuries and the possible noxious effects of the injuried tissue upon the patient indicate the need to obtain more information concerning changes in the burn skin. In this study sequential biopsies were taken from third degree burn wounds, and the proteins were extracted with saline solution. Immunoelectrophoretic techniques were used to identify the proteins that could be extracted from these biopsies and from samples of normal skin. Three burned patients and 6 normal were studied. The amounts of extractable 7 S globulin, transferrin, ceruloplasmin, alpha 1-glycoprotein, and albumin increased following the burn injury. There was little or no change in prealbumin, orosomucoid, Beta 1 lipoprotein, or fibrinogen. The proteins showing the greatest increase were those related to antibody formation or those with a 'binding' function. The possible significance of these is discussed. (Author)

AD-615 490 Div. 16/11, 16/1
CFSTI Prices: HC$2.00 MF$0.50

Space and Information Systems Div., North American Aviation, Inc., Downey, Calif.
EFFECTS OF COLD EXPOSURE UPON THE ACTION OF THERAPEUTIC DRUGS,
by James Y. P. Chen and H. C. Bergman.
Feb 65, 30p
Contract AF41 609 1989, Proj. 8241, Task 824102
AAL TDR-64-20

Unclassified report

Descriptors: (*Drugs, Low temperature research), (*Toxicity, Drugs), Exposure, Lethal dosage, Chemotherapeutic agents, Dosage, Effectiveness, Morphine, Sulfates, Barbiturates, Levarterenol, Chlorpromazine, Physiology, Stress (Physiology), Hemorrhage, Blood pressure, Mice, Rats.

Based on determinations of LD50, ED50 and therapeutic index, both in mice and rats, morphine sulfate was found to be at least six times as toxic and three times as effective in the cold (4C) as at room temperature (22 to 24C). In the rat, however, morphine showed a very wide margin of safety in the cold as well as at room temperature, the therapeutic index being about 180. With pentobarbital, the margin of safety as indicated by therapeutic index in mice and rats in the cold was only one-third that at room temperature, while no significant differences were noted in the ED50 (median hypnotic dose) of the drug in all species of animals tested at 4C and at 22C.

No significant differences were found in the plasma concentrations of the test drugs at different temperatures to account for the markedly increased toxicity of morphine and pentobarbital in all animals studied, as well as the apparent increased efficacy of morphine in mice and rats acutely exposed to cold. Greater-percentage pressor response to norepinephrine was demonstrated in dogs with or without hemorrhagic hypotension at 4C than those at 22C. The analgesic-potentiating effect of chlorpromazine was found to be greater in rats in the cold than those at room temperature when subeffective doses of morphine were administered simultaneously with a given dose of chlorpromazine. The clinical implications of these findings are discussed and recommendations are offered. (Author)

AD-615 503 Div. 16/3
CFSTI Prices: HC$1.00 MF$0.50

Oxford Univ. (England). Dept. of Pharmacology.
BIOCHEMISTRY OF BIOGENIC AMINES.
Final rept.,
by H. K. F. Blaschko. 1 Mar 65, 5p
Grant AF EOAR64 12
AFOSR 65-0668

Unclassified report

Descriptors: (*Amines, Biochemistry), (*Biochemistry, Amines), Amino acids, Oxidoreductases, Indoles, Blood plasma, Mammals, Enzymes, Adenosine phosphates, Adrenal medulla hormones, Pituitary hormones, Organic sulfur compounds, Chemoreceptors, Swine, Methionine, Great Britain.

Amino acids for awakening tranquilized animals: The meta-hydroxy analog of tyrosine was shown to have such an effect. Hydroxyindole oxidases: Many sources were established for an enzyme that will oxidize hydroxyindole derivatives. Amine oxidases: Distribution of amine oxidases in mammalian blood plasma was studied; the enzyme is related to spermine oxidase. Benzylamine oxidase from pig plasma was crystallized. Work was resumed on detaching the enzyme lysolecithin from the insoluble mitochondrial detritus. Chromaffin granules of the adrenal medulla. Posterior pituitary hormones and neurophysin: Hormones were dissociated from protein by using columns of sphadex G-25 and 0.in formic acid. Granules rich in hormones were obtained by differential centrifugation, the granules containing a protein resembling the Van Dyke protein. Sulfur containing amino acids: Optically pure L-homocystine was obtained from L-methionine.

AD-615 525 Div. 16/1, 12/3
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PHYSIOLOGIC REACTIONS OF ANIMALS DURING FLIGHTS ON THE THIRD, FOURTH, AND FIFTH SATELLITE SPACESHIPS,
by O. G. Gazenko, I. I. Kasyan, A. R. Kotovskaya, E. M. Yuganov, and V. I. Yazdovskii. 26 Jan 65, 24p
FTD-MT-64-360
TT 65-62294

Unclassified report

Edited machine trans. of Akademiya Nauk SSSR. Izvestiya. Seriya Biologicheskaya v29 n4 p497-511 1964.

Descriptors: (*Space flight, Dogs), (*Space medicine, Dogs), Physiology, Weightlessness, Medical examination, Respiration, Electrocardiography, Cardiovascular system, Blood circulation, Motor reactions, Body temperature, Hematology, X-ray photography, Behavior, USSR.

Conclusions: Flights of experimental animals in near-earth space on satellite spaceships showed an absence, during and after flight, of pathological changes in system of blood circulation and breathing. Functional shifts of basic physiologic functions of animals turned out to be the most expressed during entry of ship into orbit and descent of it to earth. In period of weightlessness, the indices of cardiovascular system for majority of dogs already in the 2-3rd turns were lowered to initial magnitudes. In state of weightlessness, both curtailing and quickening of breathing was noted. (Author)

AD-615 547 Div. 16/2
CFSTI Prices: HC$3.00 MF$0.75

Michigan State Univ., East Lansing.
STOCHASTIC MODELS FOR BACTERIOPHAGE,
Technical rept.,
by J. Gani. 19 Apr 65, 77p Rept. no. RM-128-JG-6
Contract Nonr258705, Proj. NR042 239

Unclassified report

Descriptors: (*Bacteriophages, Statistical processes), Reproduction (Physiology), Bacteria, Viruses, Mutations, Aging (Physiology), Antigens and antibodies, Desoxyribonucleic acids, Genetics, Stochastic processes, Mathematical models, Partial differential equations, Probability.

This review paper surveys work done in recent years on models for bacterial virus. The first section introduces the biological processes involved in phage reproduction and the extinction of bacterial colonies. Thereafter various models are examined for phage reproduction and mutation in bacteria, age distribution of vegetative phage, the extinction of bacterial colonies, and models for attachment of phage to bacteria and of antibody to virus. Approximately 40 references are given to papers in the field. (Author)

AD-615 570 Div. 16/1
CFSTI Prices: HC$2.00 MF$0.50

Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
A SUMMARY OF HUMAN TOLERANCE TO PROLONGED ACCELERATION.
Final rept. for Jan 63-Jan 65,
by Alvin S. Hyde and Harold W. Raab. Feb 65, 42p
AMRL TR-65-36
Proj. 7222

Unclassified report

Descriptors: (*Acceleration tolerance, Humans), Data, Tables, Graphics, Stress (Physiology), Countermeasures, Time.

Human subject tolerance to accelerations of greater than one second duration is summarized for the orthogonal X, Y, and Z axes. Because each investigator at each laboratory utilizes different restraint systems, body positions, ambient temperatures, etc, and most important, utilizes different criteria of 'tolerance,' the data are referenced and presented in tables and graphs for each major category (direction) of acceleration. The points presented in the graphs and tables are usually the highest values achieved; in each series there were subjects who could not tolerate the given direction, amplitude, and duration. (Author)

AD-615 574 Div. 16/1, 16/3, 16/11
CFSTI Prices: HC$1.00 MF$0.50

Universidad Catolica de Chile, Santiago. Laboratorio de Fisiologia.

ROLE OF THE KIDNEY IN THE FORMATION OF ACTIVE POLYPEPTIDES IN THE BLOOD.
Final technical rept. for 15 Mar 64-15 Mar 65,
by Hector Croxatto, J. Roblero, and G. Swaneck.
15 Mar 65, 22p
Grant DA ARO49 092 64G39, Proj. 2N014501B71D
Unclassified report

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Descriptors: (*Kidneys, Biochemistry), Purification, Excision, Pharmacology, Electrolytes (Physiology), Urine, Hormones, Peptides, Vasoactive agents, Amino acids, Methionine, Blood chemistry, Ascorbic acid, Adrenal glands, Corticosteroid agents, Dosage, Metabolism, Hypertension, Dogs, Rats, Chile.

Contents: Purification and chemical identification of anephrotensin obtained from nephrectomized dogs; Purification and pharmacological studies of anephrotensin obtained from chicken serum and from the frog, Calliptocephelella Gayi serum; Studies on Anephrotensin obtained from the serum of hypertensive and normal rats; Comparative studies on electrolytes and water urinary excretion between hypertensive and normotensive rats; and effects of growth hormone on the renal excretion of water and electrolytes induced by renin. Conclusions: Nephrectomized dog anephrotensin (partially purified) has at least 3 components: (a) polypeptide vasoconstrictor; (b) a second vasoconstrictor (anephrotensin); and (c) polypeptide vasodilator (bradykinin). A procedure was developed for high degree purification. Some mol.wt. studies and amino acid analyses were performed. Anephrotensin was isolated from the chicken and frog and preliminary tests in rats showed stimulatory action on adrenal glands. An improved process for purification of rat anephrotensin permitted comparison of activities with that from other sources. Hypertension was induced by encapsulating kidney. (Author)

AD-615 575 Div. 16/1, 16/3, 16/4

La Plata Univ. (Argentina). Inst. of Physiology.
THE FUNCTIONS OF THE GLYCOGEN BODY OF THE NERVOUS SYSTEM OF BIRDS.
Final technical rept. for 15 Mar 64-15 Mar 65,
by Hector O. Buschiazzo, Ricardo Bosch, Perla Mordujovich de Buschiazzo, and Ricardo R. Rodriquez.
Mar 65, 12p
Grant DA ARO49 092 64G38, Proj. 2N014501B71D
Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Birds, Nervous system), (*Nervous system, Glycogen), Ganglia, Nerve cells, Nerve fibers, Spinal column, Cytology, Embryology, Histological techniques, Insulin, Anesthesia, Epinephrine, Levarterenol, Metabolism, Adrenal glands, Hormones, Tolerances (Physiology), Morphology (Biology), Tables, Argentina.

Conclusions: Embryological: apparently no onthogenic relation exists between spinal ganglion and glycogen body; tegmental plate is considered as source of glycogen body. Histological and Cytological: glycogen was detected on dorsal and ependymal cone along nervous axis and in 'pia-glial' limiting membrane of lumbosacral region. Considerable glycogen increase was observed in dorsal septum of lumbosacral region corresponding to 'primordium' of glycogen body. Nerve fibers in the glycogen body pass through but do not belong to its structure. Physiology: (1) some behavioral changes were caused by removal of glycogen body. (2) studies of the influence of insulin and adrenal hormones are being continued. Chemical: no catecholamines were detected. In Vitro Metabolism: glucose uptake with homogenates was studied.

AD-615 578 Div. 16/15, 12/1, 25/1, 32/2
CFSTI Prices: HC$1.00 MF$0.50

Royal Inst. of Tech., Stockholm (Sweden).
ACOUSTIC SPECIFICATION OF SPEECH.
Annual final scientific rept. for 1964,
by C. G. M. Fant. 30 Jan 65, 18p
Grant AF EOAR64 28
AFCRL 65-272
Unclassified report

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Descriptors: (*Speech, Analysis), Speech recognition, Speech transmission, Acoustics, Auditory perception, Auditory signals, Hearing, Psychoacoustics, Nose, Synthesis, Specifications.

Contents:
Speech production and speech analysis;
Articulatory activity in vowels,
Dynamic model of coarticulation,
The vocal tract transfer function,
Voice source studies,
Speech at high ambient air-pressures,
The nasal cavity structure,
Speech synthesis;
The role of formant amplitudes in synthesis of nasal consonants,
Speech perception;
Auditory patterns of speech,
The spectral shape in the F2-F3-region.

AD-615 580 Div. 16/10, 16/2, 16/7
CFSTI Prices: HC$5.00 MF$1.25

Yale Univ., New Haven, Conn.
THE ACCURACY OF DIAGNOSES OF REFERRED PATIENTS IN A REGIONAL HOSPITAL SYSTEM.
Master's thesis,
by Norman Ray Penner. May 65, 193p
Unclassified report

Descriptors: (*Mycobacterium tuberculosis, Diagnosis), (*Diagnosis, Mycobacterium tuberculosis), Diseases, Hospitals, Medical personnel, Medical examination, Air force personnel, Medical equipment, Military medicine, Pathology.

The study explores the USAF Medical Service's regionalized hospital system and the accuracy of the diagnoses of referred pulmonary tuberculosis patients. The object of the study is to determine the variations in accuracy among the referring facilities and to ascertain if they are related to size and if so, to find possible causal factors. The findings indicate that a significant number of erroneously diagnosed patients do originate in small medical facilities. They also point up variations among the various patient categories. Non-military patients have a low accuracy rate in small hospitals and a high one in large facilities. Officers have a low rate in all facilities. The enlisted ranks fare the same in all facilities. The lack of diagnostic 'tools' at small hospitals was originally considered to be a possible reason for the errors in diagnosis. This was not conclusively proven to be the case. While there are minor variations in the use of diagnostic tests and procedures between the accurately diagnosed patients and the inaccurately diagnosed ones they are not strongly related

to hospital size. The greater problem seems to be the use or interpretation of the test results. The most important causal factor in diagnostic accuracy seems to be the skill and experience of the diagnosing physician in the use and interpretation of the tools available to him. (Author)

AD-615 581 Div. 26/2, 16/7, 16/8
CFSTI Prices: HC$5.00 MF$1.00

Yale Univ., New Haven, Conn.
THE QUANTITATIVE ANALYSIS OF THE QUALITY OF MEDICAL CARE PRACTICED ON A MEDICAL SERVICE IN A FEDERAL SHORT-TERM GENERAL HOSPITAL.
Master's thesis,
by Robert M. Edwards. 1965, 172p
Unclassified report

Descriptors: (*Military medicine, Air Force), (*Hospitals, Air Force), Officer personnel, Air force personnel, Public health, Medical examination, Diagnosis, Therapy, Medical personnel, Statistical analysis, Standards, Tables.

The objective of the study was to measure, quantitatively, the quality of medical care that was practiced at the USAF Hospital, Chanute Air Force Base, Illinois. Two major variables formed the basis of the comparisons. The first involved the differences in care received by officers, non-commissioned officers and lower grade enlisted patients at the Chanute Hospital. Then, the aggregate care received at Chanute was compared with that afforded patients on the University Service of the Yale-New Haven Medical Center. From the quantitative comparisons made, it was generally concluded that there was no significant difference in the quality of care practiced on the two medical services. This was in spite of the histories and physicals produced by medical students within the University Service. There was significant differences in the quality of care received by the three rank groupings within the USAF Hospital, Chanute. These differences were due almost exclusively to the poor showing made by the lower grade enlisted patients. For this group, relatively small use was made of the comprehensive long form history and physical for hospitalization in excess of 48 hours. The non-commissioned officers received the most thorough medical care, but in most instances it was not significantly better than that received by officers. (Author)

AD-615 607 Div. 16/3, 03/7, 04/3
CFSTI Prices: HC$1.00 MF$0.50

Army Chemical Research and Development Labs., Edgewood Arsenal, Md.
AN ACTIVE-CENTER DECAPEPTIDE FROM CHYMOTRYPSIN UTILIZING CYANOGEN BROMIDE CLEAVAGE.
Rept. for Sep 62-Mar 64,
by Norwood K. Schaffer, A. R. Mitchell, Richard A. Nordgren, and Bonny H. Orndorff. May 65, 16p CRDLR-3282
Proj. 1A013001A039
Unclassified report

Descriptors: (*Chymotrypsin, Molecular structure), (*Peptides, Molecular structure), Enzymes, Decomposition, Cyanogen, Bromides, Formates, Trypsin, Organic phosphorus compounds, Amino acids, Chromatographic analysis, G agents, Labeled substances.

Isopropyl methylphosphonyl chymotrypsin was cleaved with cyanogen bromide, performic acid, and trypsin. An active-center decapeptide was isolated by chromatography with Sephadex G-50 and DEAE Sephadex A-25 and paper electrophoresis. Its structure is: Gly-Asp-(IMeP)Ser-Gly-Gly-Pro-Leu-Val-CySO3H-Lys. Methionine precedes its N-terminal glycine. (Author)

AD-615 622 Div. 16/3, 16/1

Chicago Univ., Ill.
METHEMOGLOBIN REDUCTION IN INTACT G6PD DEFICIENT AND HbM ERYTHROCYTES,
by H. Frischer, P. E. Carson, and J. E. Bowman. 1964, 14p
Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Hemoglobin, Reduction (Chemistry)), (*Erythrocytes, Analysis), (*Blood chemistry, Genetics), (*Oxidoreductases, Blood chemistry), Blood counts, Separation, Spectroscopy, Enzymes.

A microscopic elution procedure has been described by KLEIHAUER and BETKE (Nature, 199:1196(1963)), capable of differentiating erythrocytes containing oxidized hemoglobin (which appear as ghosts) from those containing oxyhemoglobin (red). Previous studies using this technique in glucose-6-phosphate dehydrogenase (G6PD) deficient and HbM erythrocytes have been presented in Clin. Res., XII: 86 (1964). Parallel genetic, enzymatic, spectro-photometric and cell elution studies are shown: (1) to clarify the conditions for interpretation, (2) to study intact erythrocytes of different genetic variants of G6PD deficiency and, (3) to investigate further some of the problems associated with the expression of this X-linked gene in erythrocytes of female heterozygotes. In addition, data on 4 variants of HbM will be given where pertinent. (Author)

AD-615 628 Div. 16/3, 16/1, 16/11
CFSTI Prices: HC$1.00 MF$0.50

Karolinska Inst., Stockholm (Sweden).
CATECHOLAMINES IN THE SYMPATHETIC NERVES; ADRENERGIC NERVE TRANSMISSION.
Final rept.,
by U. S. von Euler. 1965, 6p
Grant AF EOAR64 31
AFOSR 65-0670
Unclassified report

Descriptors: (*Autonomic nervous system, Amines), (*Amines, Autonomic nervous system), Morphology (Biology), Nerves, Nerve cells, Heart, Rabbits, Epinephrine, Levarterenol, Nicotinic acid, Tissues (Biology), Excretion, Urine, Pharmacology, Borohydrides, Decaboranes.

The research was largely centered around the uptake, storage and release of catecholamines in the sympathetic nerves and studies on the mechanism of adrenergic nerve transmission. A considerable part of the work was devoted to the study of the uptake of amines after previous depletion of the stores. This line of research led to the finding that an inorganic compound, the boron hydride decaborane, which cannot replace the transmitter, depletes the stores but allows a longlasting refilling with other amines. This general principle will be used in the search for suitable compounds to replace the natural transmitter.

AD-615 635 Div. 16/1, 16/11, 30/2
CFSTI Prices: HC$3.00 MF$0.75

RAND Corp., Santa Monica, Calif.
COMPUTER STUDIES OF RESPIRATION.
Memo.,
by T. W. Murphy. May 65, 75p Rept. no. RM-4406-NIH
Grants PHS GM09608 04, PHS HE08186 03
Unclassified report

Descriptors: (*Respiration, Data processing systems), Computers, Posture, Carbon dioxide, Calibration, Statistical analysis, Drugs, Analgesics and antipyretics, Tables.

An approach to respiratory studies is described which utilizes modern data-processing (computing) equipment. The calibration of the rather complex system is described. The abilities of the device are demonstrated in an investigation of the tidal volume-dead space relationship. Advantages of this approach are discussed. (Author)

AD-615 638 Div. 30/2, 15/1
CFSTI Prices: HC$3.00 MF$0.75

LFE Electronics, Boston, Mass.
APPLICATION OF THE FOURIER TRANSFORM TO PATTERN RECOGNITION.
Final rept.,
by Robert E. Evans, Ronald J. Webber, and Morton Elmer. Apr 65, 79p
Contract AF 30 602 3359, Proj. 5581, Task 558104
RADC TDR-64-456
Unclassified report

Descriptors: (*Pattern recognition, Integral transforms), (*Integral transforms, Pattern recognition), Fourier analysis, Classification, Identification, Collecting methods, Simulation.

The use of Fourier Transform methods in pattern recognition is investigated. Two uses of the transform are suggested; (1) the Fourier coefficients of a pattern could be used as properties characterizing the pattern if such a representation is more efficient than using the pattern itself, and (2) the transform could be useful in preparing visual data for a pattern recognition device. Simulation on a computer of various ways of using the Fourier Transform in pattern recognition was done. It was concluded that while the Fourier Transform may not be applicable to (1) above, it is definitely useful as a preprocessing aid. (Author)

AD-615 661 Div. 16/4, 25/3
CFSTI Prices: HC$1.00 MF$0.50

Pennsylvania Univ., Philadelphia.
NON-THERMAL EFFECTS OF ALTERNATING ELECTRICAL FIELDS ON BIOLOGICAL STRUCTURES.
Technical progress rept. for 1 Mar 64-29 Feb 65,
by Herman P. Schwan. 13 May 65, 10p
Contract Nonr55152
Unclassified report

Descriptors: (*Biophysics, Electric fields), (*Biology, Electric fields), (*Electric fields, Alternating current), Particles, Dielectric properties, Heat, Frequency, Radiofrequency, Spheres, Time, Water, Hemoglobin, Conductivity, Thresholds (Physiology).

ORIENTING EFFECTS OF ALTERNATING ELECTRIC FIELDS ON NONSPHERICAL PARTICLES: Theoretical investigation shows that such a particle embedded in a medium having a different complex dielectric constant will generally be oriented by an alternating electrical field. RESPONSE OF NONSPHERICAL BIOLOGICAL PARTICLES TO ALTERNATING ELECTRIC FIELDS: Stable orientation evoked by an alternating electric field was studied theoretically for arbitrary shapes and compositions of biological particles. As frequency of the electric field changes, both sudden jumps and gradual changes may arise in the stable direction. STUDIES OF THE TIME CONSTANT FOR PEARL-CHAIN FORMATION: Influence of particle size and sub- and supra-threshold electric field strengths was measured. The best experimental estimate of the time constant is 1.5 (particle diameter in microns) squared, where the constant is the time in seconds required for spherical particles of low dielectric constant (< 10), suspended in an aqueous medium, to form pearl chains when the radio-frequency field strength was a threshold value. PEARL CHAINS TRANSVERSE TO THE ELECTRIC FIELD VECTOR: These were observed concurrently with longitudinal (ordinary) pearl chains. ELECTRICAL PROPERTIES OF BOUND WATER: Dielectric constant and conductivity data which pertain to hemoglobin were measured for the 1- to 1000-mc range.

AD-615 668 Div. 16/5

New York Medical Coll., N. Y.
REHARDENING OF SOFTENED TOOTH ENAMEL,
by Ward Pigman, T. Koulourides, and H. Cueto.
1963, 2p
Unclassified report

Pub. in Proceedings of the ORCA Congress (9th) p133-4 1963 (Copies available only to DDC users).
Prepared in cooperation with Alabama Univ., Birmingham. School of Dentistry.

Descriptors: (*Teeth, Hardening), Hardness, Calcification, Phosphates, Fluorides, Calcium, Bacteria, Diseases, Inhibition, Effectiveness, Saliva, Dentistry.

If enamel surfaces are exposed to freshly prepared solutions of calcium and phosphate salts above pH 6.9, the softened enamel may be rehardened. Optimal conditions at 37 degrees are approximately: calcium concentration, 1 to 2 mM/1; Ca/P ratio 1.67; pH 7.3; and fluoride concentration, 0.05 mM/1. The solutions are metastable, and the pH drops below 6.9 after 30 to 60 min. Fresh calcifying solutions are used when thepH drops below 6.9. Under such conditions, the hardness may be increased from 150 KHN to about 300 KHN in 3 to 4 hr. When the teeth had been previously softened below about 150 KHN, the recovery after exposure to rehardening solutions was less complete. Such solutions produce an increase of about 10 per cent in the hardness of ground surface enamel and of intact surface enamel, not softened previously. Saliva alone produces some rehardening of softened enamel, and the conditions affecting this action of saliva are under study. Freshly prepared rehardening solutions were incorporated in the bacteriological medium used for the production of in vitro caries by oral bacteria. Calcium, phosphate and fluoride ions were studied singly and in all combinations. Thecombination of all these ions, as expressed for the optimal conditions above, completely inhibited the in vitro caries. The combination of calcium and fluoride ions inhibited significantly, but the other combinations were relatively ineffective. (Author)

AD-615 671 Div. 16/3, 30/5

Johns Hopkins Univ., Baltimore, Md. School of Medicine.
OBSERVATIONS ON THE APPLICATION TO ELECTRON MICROSCOPY OF THE LEAD PHOSPHATE TECHNIQUE FOR THE DEMONSTRATION OF ACID PHOSPHATASE,

by Jan L. E. Ericsson and Benjamin F. Trump.
30 Sep 64, 18p
Contract DA49 193MD2379

Unclassified report

Pub. in Histochemie v4 p470-87 1965(Copies available only to DDC users).

Descriptors: (*Phosphoric monoester hydrolases, Identification), (*Electron microscopy, Phosphoric monoester hydrolases), (*Lead compounds, Phosphates), Acids, Histological techniques, Mice, Liver, Rats, Kidneys, Cells (Biology).

The effects of formaldehyde and glutaraldehyde fixation, preparation of frozen sections 50 microns thick, and incubation in Gomori medium for acid phosphatase on the appearance of parenchymal cells of mouse liver and of the cells of the proximal convoluted tubules of the rat kidney were studied by electron microscopy. Following these procedures very slight changes occurred in glutaraldehyde-fixed tissues, whereas the preservation of the tissue after formaldehyde fixation in general was inferior. A number of factors influencing the results of the Gomori lead phosphate method as applied to electron microscopy were studied and discussed, and a technique was described permitting precise localization and reproducible results on the ultrastructural level. The significance of the results was discussed in relation to presumed artifactual localizations and to the limitations on the significance of the findings caused by the effects of the preparatory procedures, with special reference to the fixation in aldehyde. (Author)

AD-615 672 Div. 16/3

Toronto Univ. (Ontario).
PLASMA ALBUMIN AS AN ACCEPTOR OF FREE FATTY ACIDS,
by James Campbell, A. D. Martucci, and G. R. Green.
30 Jan 64, 7p
Grant DRB8865 04

Unclassified report

Pub. in Biochemical Journal v93 p183-9 1964 (Copies available only to DDC users).

Descriptors: (*Serum albumin, Fatty acids), (*Fatty acids, Serum albumin), Adipose tissue, Casein, Fibrinogen, Albumins, Gelatins, Peptones, Dextran, Adrenocorticotropic hormone, Canada.

Plasma albumin was more effective in solubilizing oleate in an aqueous medium than any of five other proteins or dextran. The solubilizing effect occurred up to an oleate:plasma albumin molar ratio of 7.4, or a total free fatty acids:plasma albumin molar ratio of 7.8. Fraction V (albumin), and to a smaller extent fractions IV sub 1 and IV sub 4 of human plasma, permitted the transfer of free fatty acids from adipose tissue in vitro to the medium, but casein, fibrinogen, fraction II of plasma, egg albumin, gelatin, peptone and dextran did not. Corticotrophin increased the concentration of free fatty acids in the incubated tissue, but their release was dependent on the presence of plasma fractions V, IV sub 1 or IV sub 4. Increasing concentrations of plasma albumin in the medium increased the output of free fatty acids from adipose tissue in vitro, decreased the accumulation of free fatty acids in the tissue and increased the total amount of free fatty acids in tissue plus medium. It is concluded that the release of free fatty acids from adipose tissue a substance with special properties as an acceptor of fatty acids is an absolute requirement, and that plasma albumin performs this function most effectively. (Author)

AD-615 678 Div. 16/1, 16/7, 16/10

California Univ., San Francisco. Medical Center.
ANTIBODIES TO GAMMA-GLOBULIN IN INFANTS AND CHILDREN EXPOSED TO ISOLOGOUS GAMMA-GLOBULIN,
by E. R. Stiehm and H. H. Fudenberg. 30 Jul 64, 7p
Contract NONR3656; Grant NIHH5997

Unclassified report

Pub. in Pediatrics v35 n2 p229-35 Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Children, Immunology), (*Infants, Immunology), (*Gamma globulin, Antigens and antibodies), (*Antigens and antibodies, Gamma globulin), (*Immunology, Children), Blood groups, Genetics, Anemias, Blood transfusions, Injection (Medicine), Allergy, Sensitivity.

Isoantibodies directed against human gamma-globulin were found in children receiving single and repeated injections of gamma-globulin and in those who had received blood transfusions at birth. Nineof 14children receiving repeated gamma-globulin injections had anti-gamma-globulin antibodies. One-third of all children exposed to gamma-globulin bytransfusion or injection, but only 6% of unexposed children had anti-gamma-globulin antibodies. Females appear to have a higher incidence of sensitization than males. The possibility exists that these antibodies may be implicated in reported anaphylactic reactions to gamma-globulin. (Author)

AD-615 680 Div. 16/5

Alabama Univ., Birmingham. Medical Center
CARIOGENICITY OF COMMON SUGARS AS EVALUATED IN THE ARTIFICIAL MOUTH,
by Ward Pigman, James Brasher, and Theodore Koulourides. 1961, 3p
Contract NONR313900

Unclassified report

Pub. in Nature v195 n4837 p190-1 Jul 14 1962 (Copies available only to DDC users).

Descriptors: (*Dentistry, Carbohydrates), (*Carbohydrates, Dentistry), Teeth, Diseases, Microorganisms, Bacteria, Mouth, Glucose, Fructoses, Sucrose, Lactose, Starches.

AD-615 681 Div. 16/5

Alabama Univ., Birmingham. Medical Center.
CONDITIONS AFFECTING THE REHARDENING OF SOFTENED ENAMEL,
by Ward Pigman, H. Cueto, and D. Baugh. 1964, 9p
Contract NONR313900

Unclassified report

Journal of Dental Research v43 n6 pt1 p1187-95 Nov-Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Teeth, Hardening), Hardness, Dentistry, Acetates, Calcium, Phosphates, Fluorides, Ions, Ph, Calcification.

The best solution developed for rehardening softened enamel surfaces has the following composition: Calcium, 1.5 mM/l; phosphate, 0.90 mM/l; fluoride, 0.05 mM/l at pH 7.3-7.4 and 37C. Extensive rehardening occurred in several hours. Such solutions also 'superhardened' intact and ground enamel. Sobel's calcifying solution did

not reharden softened enamel unless fluoride ions were present. With fluoride, it rehardened well. Some of the complex relations between pH, supersaturation, and precipitation were described. Studies of other variables may improve the rehardening solutions. (Author)

AD-615 682 Div. 16/5

Alabama Univ., Birmingham. Medical Center.
EVALUATION OF ANTICARIES AGENTS BY THE USE OF THE ARTIFICIAL MOUTH,
by Ward Pigman and Ernest Newbrun. 3 Nov 61, 9p
Contract NONR313900

Unclassified report

Pub. in Journal of Dental Research v41 n6 p1304-11 Nov-Dec 62
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Dentistry, Mechanical organs), Medical equipment, Mouth, Teeth, Diseases, Etiology, Sodium compounds, Fluorides, Microorganisms, Hardness, Inorganic acids, Ph, Tests.

An improved method was presented for the operation of the artificial mouth for the purpose of evaluating anticaries agents. Sodium and stannous fluoride solutions were used to treat the ground surfaces of human teeth. The teeth were then exposed to oral micro-organisms in the artificial mouth, and the rate of softening was followed by microhardness tests. Other possible anticaries agents were also studied. Treatment of enamel with dilute hydrofluoric acid decreased the rate of softening of teeth but caused an initial softening not shown by stannous fluoride solution of even lower pH. The procedure was also used to compare the efficiency of 6 commercial dentifrices. Those containing fluorides had the greatest effect in reducing the rate of softening of tooth enamel. (Author)

AD-615 700 Div. 16/4

Saskatchewan Univ., Regina. Div. of Natural Sciences.
THE FUNCTIONAL MORPHOLOGY OF THE MOUTH-PARTS OF SOME MOSQUITO LARVAE,
by A. M. Pucat. 1965, 47p

Unclassified report

Pub. in Quaestiones Entomologicae v1 p41-86 1965
(Copies available only to DDC users).

Descriptors: (*Culicidae, Mouth), (*Morphology (Biology), Culicidae), Larvae, Head, Food, Biology, Canada.

Homologies of the parts of the maxilla and the labium of mosquito larvae were studied. The name cardobasistipes is proposed for the triangular sclerite latero-posterior of the maxilla, previously known as the cardo or the palpifer. The numbers of serrations on the prementum and submentum were found to be of taxonomic value. The sequence of mouthpart movements of filter feeding and browsing species, and the progress of food particles from the feeding current into the mouth were observed. Differences in stiffness were found among the setae in different positions on the mouthparts. These differences were confirmed by staining the cuticle with Mallory's triple stain and are correlated with the functions of the setae during feeding. Flexible serrations at the tips of the labral brush hairs are used for raking food particles in most of the browsing species of Aedes and Culiseta studied. When in pond water neither the browsing nor the filter feeding larvae select the type of food they ingest. Feeding behavior of the predatory larvae of Chaoborus americanus (Johannsen) and Mochlonyx velutinus (Ruthe) was observed. (Author)

AD-615 703 Div. 16/3

Tufts Univ., Boston, Mass. School of Medicine.
LIPASES OF BLOOD AND TISSUES. II. KINETIC STUDIES ON HEPARIN-INDUCED PLASMA LIPASE.
Doctoral thesis,
by Bronius Baskys, Edmund Klein, and Walter F. Lever.
12 Sep 61, 6p
Contracts DA49 193MD1101, DA49 193MD2081

Unclassified report

Pub. in Archives of Biochemistry and Biophysics v99 n1 p31-5 Oct 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Enzymes, Reaction kinetics), (*Fats, Enzymes), Fatty acids, Blood plasma, Tissues (Biology), Heparin, Lipoproteins, Hydrolysis.

The kinetic properties of a purified preparation of heparin-induced plasma lipase have been studied. The optimum pH of this enzyme preparation is 7.9-8.1; the optimum temperature is 37-40C.; the energy required for activation is approximately 10,000 cal.; the Michaelis-Menten constant is .00198M. The heparin-induced plasma lipase hydrolyzed the triglycerides of an olive oil emulsion and of human chylomicra at approximately equal rates but did not hydrolyze tributyrin or triacetin. (Author)

AD-615 705 Div. 16/1, 16/12, 28/3, 28/5
CFSTI Prices: HC$7.00 MF$1.75

Army Medical Service Graduate School, Washington, D. C.
SYMPOSIUM ON STRESS (16-18 MARCH 1953).
16 Mar 53, 341p

Unclassified report

Descriptors: (*Stress (Physiology), Symposia), (*Stress (Psychology), Symposia), (*Military medicine, Stress (Physiology)), (*Military psychology, Stress (Psychology)), Neuroses, Military personnel, Adjustment (Psychology), Psychiatry, Oxygen consumption, Metabolism, Endocrine glands, Epinephrine, Levarterenol, Behavior, Emotions, Anxiety, Motivation, Culture, Diseases, Battle injuries, Casualties, Psychological warfare, Group dynamics.

Contents: Acute and sustained high energy output; adjustment of 02 supply and demand in organs; visceral circulation in homeostasis; metabolic responses in acute and chronic stress; pituitary-adrenocortical system in stress situations; adrenalin and noradrenalin in stress situations; behavioral regulation of homeostasis; stress in combat zones; psychological transactions in stress situations; chronic situations evoking psychological stress and common signs of resulting strain; life situations, emotions, and bodily disease; common psychological defense to stressful situations and the patterns of breakdown when they fail; interpersonal communication of anxiety; situations evoking stress in human groups and group behavioral changes denoting strain; responses to disaster in American cultural groups; cultural perspectives on stress; reciprocal relations between incentives, motivation, and strain in acute and chronic stress; psychological adaptive process in life-threatening injuries; clinical management of severe injuries; reconditioning of severely injured men, with particular reference to the management of paraplegia; role of the leader in prevention of disease; roles of food, rest, and rotation as defenses against psychological strain; personnel selection, classification, and assignment in relation to stress; psychotherapy in the combat zone; influence of drugs on certain stressful states; experimental evocation of stress; implications of stress in psychological warfare.

AD-615 710 Div. 30/5
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
CYBERNETICS,
by M. E. Maron. May 65, 8p Rept. no. P-3144
Unclassified report

Paper written for inclusion in The International Encyclopedia of the Social Sciences.

Descriptors: (*Cybernetics, Theory), Communication theory, Control systems, Feedback, Digital computers, Bionics, Simulation, Reviews.

AD-615 721 Div. 16/1, 16/10
CFSTI Prices: HC$6.00 MF$1.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
FUNCTIONS OF THE ORGANISM UNDER CONDITIONS OF AN ALTERED GAS MEDIUM.
Jul 60, 251p MCL-202
TT 60-23601
Unclassified report

Trans. of mono. Funktsii Organizma v Usloviyakh Izmenennoi Gazovoi Sredy, Moscow/Leningrad, 1958, 157p.

Descriptors: (*Stress (Physiology), High altitude), (*Anoxia, Stress (Physiology)), Nitrogen, Oxygen, Physiology, Tissues (Biology), Temperature, Etiology, Diseases, Respiration, Pressure, Strychnos alkaloids, Electrocardiography, Central nervous system, Morphology (Biology), Oxidoreductases, Hemopoietic system, Adaptation (Physiology), Spinal column, Parenteral infusions, Toxicity, Nerves, Heart, Proteins, Metabolism, Ganglia, Hypoxia, Cardiovascular system, Digestivesystem, Absorption (Biological).

Contents: Effect of reduced partial oxygen pressure on the organism, and the mechanisms for balancing this effect; Mechanism of development of severe forms of Caisson Disease; Effect of enhanced tissue hydration and ambient temperature on the occurrence and severity of Caisson Disease symptoms at high altitudes; Supersaturated solutions of gases in liquids and their importance in the etiology and prophylaxis of Caisson Disease; Effect of oxygen inhalation at normal and elevated pressure on the hemodynamics and electrocardiograms of man; Effect of parenteral administration of small doses of strychnine and physiologic solution on the course of hyperoxemic spasms in mice; Functional and morphological changes in the central nervous system in a rarefied atmosphere corresponding to an altitude of 18,000 meters; Influence of efferent nerves on the heart's activity in asphyxia and hypoxemia; Importance of afferent impulses from receptor organs in the occurrence and course of hypoxemia spasms; Effect of protein intake on certain indices of gas and nitrogen metabolism in dogs under conditions of severe hypoxemia; Effect of reduced pressure on activity of cytochrome oxidase; Absorption of certain digestion products and saline solutions in various stages of hypoxemia.

AD-615 738 Div. 29/6, 20/2
CFSTI Prices: HC$3.00 MF$0.50

Defense Atomic Support Agency, Albuquerque, N. Mex.
EVALUATION OF EYE PROTECTION AFFORDED BY AN ELECTROMECHANICAL SHUTTER,
by Wayne E. Gulley, Robert D. Metcalf, Mathew R. Wilson, and Jerome A. Hirsch. 29 Apr 60, 52p
Proj. 4.2
WT 1429
Unclassified report

Rept. on Operation PLUMBBOB, Nevada Test Site, May-Oct 57.

Descriptors: (*Flashblindness, Safety devices), (*Eyeglasses, Flashblindness), Electrical equipment, Thermal radiation, Nuclear explosions, Radiation effects, Burns, Visual acuity, Airborne, Operation, Pathology.

The project's objective was to evaluate a high-speed electromechanical shutter that was developed as a protective device against flashblindeness. The shutter was tested during five shots by the use of animal and human subjects. The thermal energy incident on the shutters ranged from 0.0347 to 0.1804 cal/sq cm. Illumination incident on the shutters ranged from 13,200 to 120,000 lumens/sq ft. The shutter closure time was 550 ± 50 micro sec. Recovery after exposure of visual effectiveness of personnel protected by the shutter was instantaneous and complete, whereas unprotected animals received chorioretinal burns. It was concluded that a shutter of the type tested during this operation offered protection from flashblindness. The electromechanical shutter was sufficiently developed to be incorporated into a goggle for service testing. A simple relationship is also given for scaling peak photometric illumination against peak thermal irradiance. (Author)

AD-615 739 Div. 16/1, 16/14
CFSTI Prices: HC$2.00 MF$0.50

Army Chemical Research and Development Labs., Edgewood Arsenal, Md.
ULTRASTRUCTURE OF THE RUMEN EPITHELIUM OF THE GOAT (Capra hircus).
Rept. for Jan 64-Feb 65,
by Nobuko O. Kuhn and John H. Thompson. May 65, 35p CRDLR-3287
Proj. 1M012501A27
Unclassified report

Descriptors: (*Bovines, Gastrointestinal system), (*Gastrointestinal system, Histology), (*Histology, Gastrointestinal system), Stomach, Physiology, Tissues (Biology), Microstructure, Electron microscopy, Cells (Biology), Morphology (Biology), Proteins, Mitochondra, Cytoplasm, Microsomes, Membranes (Biology).

The electron microscopy of the rumen of thegoat was correlated with the physiology of that organ. The ruminant forestomach (the rumen) is lined by parakeratotic, stratified squamous epithelium and is an active site of absorption of nutriments, including fatty acids, water, and electrolytes. The fine structure correlates with this absorptive capacity in the following ways: (1) keratinization is partial; (2) the lesser degree of keratinization is associated with a corresponding decrease in the number and size of tonofibrils as comparedto skin; (3) mitochondria are numerous in all cell layers, except in the corneum, and many of them contain inclusion granules; (4) cytoplasmic processes are prominent, thus increasing surface area; (5) much intercellular space occurs between the processes; and (6) no mucous or sebaceous glands are present. Some interesting morphologic findings are noted, including the presence of clear cells in the rumen epithelium, a possible receptor organ, three different types of cell connections, and cross striations in desmosomes and half-desmosomes. (Author)

07. Chemistry

AD-615 194 Div. 25/7

Biophysics Lab., Stanford Univ., Calif.
TRIPLET ESR IN L-TYROSINE,
by J. E. Maling, K. Rosenheck, and M. Weissbluth.
1 Aug 64, 9p BL-116
Contract Nonr22536; Grant NSF GB1409
Unclassified report

Pub. in Photochemistry and Photobiology v4 p241-9 1965 (Copies available only to DDC users).

Descriptors: (*Tyrosine, Paramagnetic resonance), (*Paramagnetic resonance, Tyrosine), Excitation, Ultraviolet radiation, Line spectrum, Ultraviolet spectroscopy, Electron transitions, Atomic energy levels, Optical analysis, Absorption spectrum, Spectrophotometers.

Triplet state electron spin resonances have been observed from L-tyrosine in low temperature glasses at 77K on irradiation by u.v. light in the band between 220 and 300 millimicrons. Two different resonances have been observed. and ESR spectra and optical absorption spectra as a function of degree of ionization show that the resonances are due to the ionized and un-ionized forms of tyrosine respectively. Solvent composition and temperature affect the ratio of the concentrations of the two forms but not their resonant fields. The resonances have half lives of from two to three seconds at 77K. (Author)

AD-615 246 Div. 04/1, 26/3
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
LIQUEFACTION OF NATURAL GAS,
by Yu. I. Bokserman and R. P. Polyanskii.
29 Apr 65, 17p FTD-TT-64-1271
TT 65-62246
Unclassified report

Unedited rough draft trans. of Gazovaya Promyshlennost (USSR) n8 p19-25 1956.

Descriptors: (*Liquefied gases, Methane), (*Methane, Liquefied gases), (*Manufacturing methods, Liquefied gases), Processing, Purification, Driers (Apparatus), Desiccants, Cooling, Compressors, Petroleum, USSR.

The paper describes a process for, (a) obtaining liquefied methane from natural gas; and (b) the storage and preservation of liquefied methane.

AD-615 247 Div. 04/4
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
MECHANISM OF THE ACTION OF VISCOUS ADDITIVES,
by E. G. Semenido. 27 Apr 65, 10p
FTD-TT-64-1274
TT 65-62247
Unclassified report

Unedited rough draft trans. of Neftyanoe Khozyaistvo (USSR) v32 n3 p38-41 1954.

Descriptors: (*Oils, Viscosity), (*Additives, Oils), (*Polymers, Oils), Physical properties, Colloids, Temperature, Mixtures, USSR.

AD-615 262 Div. 25/7, 25/5
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
NON-LINEAR ABSORPTION OF LASER RADIATION BY ATOMIC SYSTEMS,
by H. K. Shepard and H. T. Yura. Mar 65, 45p
Rept. no. RM-4478-PR
Contract AF49 638 700
Unclassified report

Rept. on Proj. Rand.

Descriptors: (*Lasers, Photons), (*Photons, Absorption), (*Atoms, Excitation), Atomic energy levels, Field theory, Quantum mechanics, Perturbation theory.

A three-level atomic system is considered whose energy level structure allows the absorption of two laser photons via a real intermediate state, and the rates are calculated of single and double photon absorption as a function of the electric field strength E. For weak fields it is found that the single and double photon absorption rates are proportional to E-squared and E to the fourth power, respectively, while for strong fields both the single and double absorption rates tend to constants independent of E (i.e., they saturate). Situations are found where the ratio of the double photon absorption rate to the single photon rate is of the order 6. Also considered is the case of two different laser beams (of different intensities and frequencies) interacting with a three-level atomic system. The rate of absorption of two photons, one from each beam, is calculated. Under certain circumstances it is found that the two photon absorption rate is a few times larger than the single photon rate. Numerical estimates are given of a double photon absorption process in neutral chromium and postassium vapor. (Author)

AD-615 268 Div. 25/7
CFSTI Prices: HC$1.00 MF$0.50

Theoretical Chemistry Inst., Univ. of Wisconsin, Madison.
LONG-RANGE INTERACTION OF TWO 1s-HYDROGEN ATOMS EXPRESSED IN TERMS OF NATURAL SPIN-ORBITALS,
by J. O. Hirschfelder and P. O. Lowdin. 29 Apr 65, 11p WIS-TCI-92
Contract AF33 616 3414
Unclassified report

ERRATA, Molecular Physics 2, 229 (1959).

Descriptors: (*Hydrogen, Atomic orbitals), (*Atomic orbitals, Hydrogen), Errors, Corrections.

A numerical error was discovered in the calculations of the inverse eighth power dispersion energy, B(sub 8)/R to the 8th power, as reported earlier ('Molecular Physics' 2:229 (1959)). The corrected result agrees with the value of Pauling and Beach ('Phys. Rev.' 47:686 (1935)).

AD-615 284 Div. 04/2, 04/1
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
METHOD OF OBTAINING 60- TO 70- PERCENT NITRIC ACID,

by M. E. Pozin and L. Ya. Tereshchenko. 21 Apr 65, 7p FTD-TT-64-1195
TT 65-62272

Unclassified report

Unedited rough draft trans. of Russian patent 161702, pub. 1 Apr 64, appl. 804 064/23-4.

Descriptors: (*Nitric acid, Synthesis (Chemistry)), Nitrogen, Oxides, Dioxides, Ammonia, Absorption, Towers, Iron compounds, Sulfates, Patents, USSR.

Object of the Invention: A method of obtaining 60- to 70-percent nitric acid through oxidation and absorption by water of nitrose gases obtained by the conversion of ammonia which is distinguished by the fact that for the purpose of intensification of the process and the obtaining of a high degree of utilization of the nitrogen involved, the nitrose gases are subjected to oxidation by the circulation of nitric acid and are directed for absorption by water into the upper part of an absorption column, while the remaining gas which contains nitrogen and nitrogen oxide is treated with a liquid absorbent, for example, the solution of FeS04, the solution obtained being subjected to heating, and the nitrogen oxide separated in this way oxidized by air and directed into the lower part of the absorption column for absorption of the nitric acid obtained in the upper part of the absorption column while the unabsorbed nitrogen oxides are directed into the nitrose gas after conversion of the ammonia. (Author)

AD-615 285 Div. 25/7
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
EXPERIMENTAL MEASUREMENT OF RHT ABSORPTIVITY OF AIR BEHIND THE FRONT OF A SHOCK WAVE,
by S. A. Losev and N. A. Generalov. 23 Apr 65, 6p FTD-TT-6-1223
TT 65-62273

Unclassified report

Unedited rough draft trans. of mono. Fizicheskie Problemy Spektroskoppii (Physical Problems in Spectroscopy) Moscow 1962 p114-6. Conference on Spectroscopy (no. 13) Leningrad, 1960. Materials, v1, Moscow, 1962, p 114-6.

Descriptors: (*Air, Absorption spectrum), (*Absorption spectrum, Air), Experimental data, Shock waves, Shock tubes, Temperature, Ultraviolet spectroscopy, USSR.

AD-615 289 Div. 04/3
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div. Air Force Systems Command, Wright-Patterson AFB, Ohio.
METHOD OF OBTAINING 2-CHLOR-4, 6-DI- AND 2, 4, 6-TRI (2, 4-DICHLORANILINE) SYMMETRICAL TRIAZINES,
by N. V. Kozlova and D. F. Kutepov. 27 Apr 65, 6p FTD-TT-64-1276
TT 65-62262

Unclassified report

Unedited rough draft trans. of Patent (USSR) 143 808, pub. 14 Feb 61, appl. no. 697 565/23/.

Descriptors: (*Azines, Preparation), Chlorine compounds, Aromatic compounds, Amines, Chlorination, Patents, USSR.

Object of the Invention: A method of obtaining 2-chlor-4, 6-di- and 2,4,6-tri-(2,4-dichloraniline) symmetrical triazines from analine and cyanurchloride, which is distinguished by the fact that for the purpose of obtaining high yields of final products the intermediate products obtained 2-chlor-4, 6-dianiline and 2,4,6-trianiline, symmetrical triazines are chlorinated to the point of having 2 atoms of chlorine in aromatic nuclei of the end products. (Author)

AD-615 290 Div. 04/3, 14/8
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PREPARATION OF DIAMIDE OF PERFLUORGLUTARIC ACID,
by I. M. Dolgopolskii and G. B. Fedorova.
27 Apr 65, 5p FTD-TT-64-1277
TT 65-62263

Unclassified report

Unedited rough draft trans. of Russian Patent 147183, pub. 24 Mar 61, appl. 723118/23.

Descriptors: (*Dibasic acids, Fluorine compounds), (*Fluorine compounds, Dibasic acids), (*Amides, Synthesis (Chemistry)), Patents, Nitriles, Ammonia, Heat-resistant plastics, Organic nitrogen compounds, Preparation, USSR.

The object of the invention is a method of obtaining diamide of perfluorglutaric acid which is distinguished bythe fact that, for the purpose of using by-products in the production of perfluorglutaronitrile imide, perfluorglutaric acid is subjected to interaction with ammonia. (Author)

AD-615 331 Div. 04/3
CFSTI Prices: HC$1.00 MF$0.50

California State Coll., Los Angeles.
THE PHOTOLYSIS OF 2,3-DICARBAHEXABORANE(8),
by John R. Spielman and James E. Scott, Jr.
1 May 65, 4p Technical rept. no. TR-8
Contract Nonr336400, Proj. NR052 427

Unclassified report

Descriptors: (*Organoboranes, Photochemistry), (*Photochemistry, Organoboranes), Ultraviolet radiation, Pentaboranes, Synthesis (Chemistry).

Ultraviolet irradiation of 2,3-dicarbahexaborane(8), (C2B4H8) vapor was shown to give greatly improved yields of 1,5-dicarbaclovopentaborane(5) (C2B3H5), 1,2-dicarbaclovohexaborane(6) (1,2-C2B4H6), and 1,6-dicarbaclovohexaborane(6) (1,6-C2B4H6). No evidence wasfound of the formation 2,4-dicarbaheptaborane(7) (C2B5H7).

AD-615 355 Div. 04/3, 04/2

Mellon Inst., Pittsburgh, Pa.
AN ARYLAZO DERIVATIVE OF MOLYBDENUM,
by R. B. King and M. B. Bisnette. 21 Oct 64, 2p
Grant AF AFOSR580 64
AFOSR 65-0614

Unclassified report

Pub. in Journal of the American Chemical Society v86 p5694 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Metalorganic compounds, Preparation),

(*Molybdenum compounds, Organic nitrogen compounds), Transition elements, Spectra (Infrared), Nuclear magnetic resonance.

The first compound with an arylazo group, RN:N, directly bonded to a transition metal, was prepared following the investigation of reactions between aryldiazonium salts and metal carbonyl anions. By the addition of solid p-anisyldiazonium tetrafluoborate to excess NaMo(CO)3C5H5 in tetrahydrofuran, there were obtained red-orange crystals, m.p. 78 to 79 degrees, of p-CH3OC6H4N2Mo(CO)2C5H5.

AD-615 356 Div. 04/3

Milan Univ. (Italy).
TRICARBONYL- AND HYDRIDETRICARBONYLBIS-TRIPHENYLPHOSPHINERHENIUM,
by M. Freni, D. Giusto, and V. Valenti. 1964, 2p
Grant AF EOAR64 9
AFOSR 65-0685

Unclassified report

Pub. in Journal of Inorganic and Nuclear Chemistry v27 p755-6 1965 (Copies available only to DDC users).

Descriptors: (*Metalorganic compounds, Rhenium compounds), (*Rhenium compounds, Metalorganic compounds), (*Phosphines, Metalorganic compounds), Polycyclic compounds, Hydrides, Synthesis (Chemistry), Spectrum (Infrared), Nuclear magnetic resonance, Electric moments, Italy.

The pentahydridetristriphenylphosphinerhenium, ReH5L3 (L = P(C6H5)3) reacts with carbon monoxide at high pressure giving a crystalline, air stable, white solid. It is diamagnetic both in the solid state and in solution, a nonelectrolyte and has a dipole moment of 2.5 D. The elementary analysis and the molecular weight determined in benzene agree with the formula ReH(CO)3L2. The I. R. spectrum in nujol shows several peaks in the range 2000-1900/cm, which can be assigned to the C-O stretching frequency. The N.M.R. spectrum in CDCl3 shows a triplet (J = 17.5 c.p.s.) at. + 5.35 p.p.m. assigned to the hydridic proton and due to the interaction of two equivalent phosphorus atoms with the hydrogen atom. Tricarbonylbistriphenylphosphinerhenium, obtained as reported above, was found to be identical with the compound obtained by reacting dirheniumdecacarbonyl with triphenylphosphine. The crystalline, white solid is a non-electrolyte, diamagnetic in the solid state but paramagnetic in benzene solution, and has an electric moment very close to zero. It shows the same I.R. spectrum, in benzene solution, as ReH(CO)3L2: NaBH4 reduction gives back the latter compound. The identity between the I.R. spectrum of the monovalent hydride and that of zerovalent compound is unexpected and might be explained by a delocalization of the hydrogen atom. (Extracted)

AD-615 377 Div. 25/7

Air Force Cambridge Research Labs., Bedford, Mass.
ABSORPTION SPECTRUM OF ELECTRICALLY EXCITED NITROGEN MOLECULES IN THE VACUUM-UV REGION.
Physical Sciences Research Papers,
by M. Ogawa, Y. Tanaka, and A. S. Jursa. 7 Aug 64, 14p Paper no. PSRP-89, AFCRL 65-216
Proj. 8627, Task 8627 02

Unclassified report

Pub. in The Journal of Chemical Physics v41 n11 p3351-6 Dec1 1964.
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Excitation, Nitrogen), (*Nitrogen, Molecular spectroscopy), (*Absorption spectrum, Nitrogen), Molecules, Ultraviolet spectroscopy, Atomic energy levels, Electron transitions, Vibration.

When electrically excited nitrogen was used as an absorber, about one hundred absorption bands were observed in the 1080-1300 A region. They are not due to absorption by ordinary nitrogen, but are produced by transitions from the vibrationally excited (v = 4-13) ground state X 1 Sigma sub g (+) to the j 1 Sigma sub u (+), b 1 Pi sub u, L 1 Pi sub u, m 1Pi sub u, and b' 1 Sigma sub u (+) states. (Author)

AD-615 378 Div. 04/3

Air Force Cambridge Research Labs., Bedford, Mass.
9-DICYANOMETHYLENE-2, 4, 7-TRINITROFLOURENE, A NEW ELECTRON ACCEPTOR.
Physical Sciences Research papers,
by Tapan K. Mukherjee and Leonard A. Levasseur.
24 Jul 64, 11p Paper no. PSRP-87, AFCRL 65-186
Proj. 8659, Task 865901

Unclassified report

Pub. in Journal of Organic Chemistry v30 p644-6 Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Complex compounds, Preparation), (*Fluorenes, Chemical properties), (*Organic nitrogen compounds, Fluorenes), Nitriles, Acids, Synthesis (Chemistry), Salts, Lithium compounds, Ammonium compounds, Molecular structure, Spectrum (Infrared), Atomic orbitals, Thermochemistry, Electrons.

A report is given of the preparation of 9-dicyanomethylene-2,4,7-trinitrofluorene (DTF), an acceptor which has superior complexing properties to its precursor, 2,4,7-trinitrofluorenone (TNF). In addition DTF forms stable anion-radical salts of lithium and triethylammonium cations. The alternative procedure of piperidine-catalyzed condensation in methyl alcohol gave an excellent yield of DTF. The structure DTF was assigned on the basis of elemental analysis and infrared spectrum. Solid charge-transfer complexes of DTF with aromatic hydrocarbons and amines are easily prepared by mixing chloroform or dichloromethane solutions of the components. In comparison with the TNF-hydrocarbon complexes, it was generally observed that the extent of dissociation into components on crystallization is markedly less with the corresponding DTF-hydrocarbon complexes. (Extracted)

AD-615 408 Div. 25/7, 25/4, 25/5
CFSTI Prices: HC$1.00 MF$0.50

General Dynamics/Convair, San Diego, Calif.
INTENSITIES OF PURE ROTATIONAL BAND SYSTEMS OF SYMMETRIC TOP MOLECULES,
by William Malkmus. Mar 65, 20p
Scientific rept. no. SR-2, GD/C-DBE65-002
Contract AF19 628 4360, Proj. 8662, ARPA Order 363
AFCRL 65-208

Unclassified report

Descriptors: (*Molecular rotation, Infrared spectroscopy), (*Band spectrum, Molecular rotation), Quantum mechanics, Vibration, Integration, Molecular structure, Raman spectroscopy, Molecular spectroscopy, Diatomic molecules, Dipole moments.

An exact expression for the total intensity of the pure rotational band system of a rigid symmetric top molecule is derived. An approximate expression for the mean spectral absorption coefficient is obtained and is compared with previously published results. The first-order

effects of non-rigidity and mechanical anharmonicity on the band intensity are investigated in the special case of a diatomic molecule and found to be small in general. (Author)

AD-615 438 Div. 20/1, 04/3
CFSTI Prices: HC$1.00 MF$0.50

Mellon Inst., Pittsburgh, Pa.
NUCLEAR MAGNETIC RESONANCE,
Final scientific rept.,
by A. A. Bothner-By. 15 Mar 65, 6p
Contract AF49 638 980; Grant AF AFOSR199 63
AFOSR 65-0579

Unclassified report

Descriptors: (*Nuclear magnetic resonance, Organic compounds), Nuclear spins, Nuclear spectroscopy, Butane, Aldehydes.

A chronological bibliography is given of publications on nuclear magnetic resonance having appeared or anticipated. Research is summarized on the use of nuclear magnetic resonance spectra in chemical analysis. Work on spin-spin coupling constants, conformal studies, and magnetic anisotropy is summarized.

AD-615 441 Div. 04/4, 24/2
CFSTI Prices: HC$3.00 MF$0.75

Technical Operations Research, Burlington, Mass.
RESEARCH ON IMPROVING THE EFFICIENCY AND SPECTRAL RESPONSE OF PHOTOPOLYMERIZATION.
Rept. for 9 Apr 64-9 Feb 65,
by Stanley Chaberek. Apr 65, 63p Rept. no. TO-B-65-17
Contract AF33 615 1104, Proj. 6272, Task 27204
AL TR-65-76

Unclassified report

Descriptors: (*Polymerization, Photochemistry), (*Photochemistry, Polymerization), Photographic chemicals, Color film, Viscosity, Oxygen, Inhibition, Color photography, Ketones, Fatty acids, Amides, Gelatins, Enzymes, Sulfites, Water, Effectiveness, S-Heterocyclic compounds, N-Heterocyclic compounds, Polycyclic compounds.

The ultimate objective of this research program is the development of a nonsilver halide photographic process based upon photopolymerization. Work toward this goal was in three main areas: (1) study of the effects of viscosity on photopolymerization; (2) elimination of oxygen inhibition; and (3) evaluation of efficient visible-light-activated free-radical initiator systems. Studies into the kinetics of photopolymerization of acrylamide in gelatin slabs as a function of water content and the nature of the activator molecule showed that efficient polymer yields and molecular weights were obtained at water levels of 30% to 85%, but lower yields were obtained at lower water levels. Oxygen removal was investigated with bisulfite ion, oxygen-carrying metal chelates, and enzymes. Although the bisulfite approach appears useless, the other two procedures warrant additional investigation. A re-evaluation of the kinetics and mechanism of photopolymer processes activated by acetylacetone and dimedon indicated that photoinitiation results from the reaction with the monomer of a light-excited thionine-B-diketone complex. (Author)

AD-615 443 Div. 25/7, 15/1
CFSTI Prices: HC$1.00 MF$0.50

Queen's Univ., Belfast (Northern Ireland). Dept. of Applied Mathematics.
THE LONG RANGE INTERACTION OF ATOMS AND MOLECULES,
by Y. M. Chan and A. Dalgarno. 1965, 17p
Scientific rept. no. SR-1
Contract AF61 052 780
AFCRL 65-244

Unclassified report

Descriptors: (*Atoms, Molecules), (*Molecules, Atoms), (*Perturbation theory, Molecules), Polarization, Hydrogen, Quantum mechanics, Calculus of variations, Integration, Electrostatic fields.

The long range interaction between atomic systems is expressed in terms of multipole frequency-dependent polarizabilities of the separate systems and a variational procedure is set up for calculating them. Application is made to a pair of hydrogen atoms.

AD-615 466 Div. 25/7, 02/7, 20/1
CFSTI Prices: HC$4.00 MF$1.00

Electro-Dynamics Labs., Utah State Univ., Logan.
OPTICAL EXCITATION OF OXYGEN BY 20 TO 100-KEV PROTONS,
by R. Gary Layton, Doran J. Baker, Fon R. Brown, and John J. Merrill. 1 Feb 65, 145p
Scientific rept. no. SR-1
Contract AF19 628 251, Proj. 8658, Task 865802
AFCRL 65-194

Unclassified report

Descriptors: (*Excitation, Oxygen), (*Protons, Excitation), (*Spectra (Visible and ultraviolet), Oxygen), Aurorae, Upper atmosphere, Luminescence, Electron transitions, Ionization, Proton bombardment.

A spectroscopic study was made of the light (3000 - 5700 A) emitted from impact of 18 to 102-kev protons with molecular oxygen at pressures from 1 to 400 milli-Torr. The dominant emissions were from O(+) and O2(+). Only a few weak O lines were observed since the major ones lie outside the spectral range measured. A single weak O(++) line was identified, indicating that excited O(++) was not a major product of the collisions. No O2 spectra were detected. At lower proton energies, the H-beta line was prominent, indicating capture of electrons into excited states by the incident H(+). Absolute emission cross sections were determined for all major transitions observed, and absolute excitation cross sections were calculated for several O(+) states. The brightest O(+) multiplet (3s4P - 3p4D°) had a maximum emission cross section of 2.2 x 10 to the -19th power sq cm, which occurred at a proton energy of about 30 kev. The variation of emission intensities with target gas pressure and beam current were investigated in order to determine the occurrence of secondary excitations. Comparisons are made of the laboratory spectra with auroral spectra. (Author)

AD-615 495 Div. 04/4
CFSTI Prices: HC$3.00 MF$0.75

Electrochemistry Research Lab., Western Reserve Univ., Cleveland, Ohio.
THE ELECTROCHEMISTRY OF OXYGEN ON NICKEL OXIDE,
by Akiya Kozawa and Ernest Yeager. 1 Nov 64, 55p Technical rept. no. TR-1
Contract Nonr143909, Proj. NR056 451

Unclassified report

Descriptors: (*Electrochemistry, Nickel compounds), (*Nickel compounds, Oxides), (*Oxides, Nickel compounds), (*Oxygen, Electrodes), Reduction (Chemistry), Peroxides, Reaction kinetics, Fuel cells, Alkaline cells.

The electrochemistry of oxygen has been examined on both pure and lithiated nickel oxide prepared by the oxidation of nickel at elevated temperatures. The rest potentials of such electrodes in alkaline solutions containing oxygen and peroxide have been found to be very close to those expected on the basis of the standard electrode potential for the oxygen-hydrogen peroxide couple and follow the Nernst dependence on peroxide concentration expected for this couple. Cathodic coulombic efficiency measurements indicate that the majority of the current is derived from the reduction of oxygen to the peroxide. Voltammetry studies indicate that oxygen reduction to peroxide and the reverse process can be relatively easily accomplished on nickel oxide, particularly the lithiated nickel oxide, but that the further two-electron reduction of peroxide to water and hydroxide ions is extremely irreversible. The dissolution rates for NiO also have been examined in various solutions and found to be very low even in acid solutions at somewhat elevated temperatures. (Author)

AD-615 558 Div. 04/4
CFSTI Prices: HC$2.00 MF$0.50

Battelle Memorial Inst., Columbus, Ohio.
THE THERMAL STABILITY OF SOME ARYLSILANES.
Interim rept. for 1 May 60-30 Apr 64,
by Arthur Levy, Robert W. Coutant, Earl L. Merryman, and Donald E. Trent. Apr 65, 45p
Contract AF33 616 7236, Proj. 7023, Task 702301
ARL 65-64

Unclassified report

Descriptors: (*Silanes, Pyrolysis), Polycyclic compounds, Stability, Decomposition, Reaction kinetics, Disproportionation, Free radicals, Thermochemistry.

The decomposition of the following arylsilanes was investigated by static and flow procedures: (I) tetraphenylsilane, (II) triphenylsilane, (III) diphenylsilane, (IV) monophenylsilane, (V) hexaphenyldisilane, (VI) triphenyl-bromophenylsilane, (VIII) diphenyl-bis (bromophenyl)silane. I and V decompose via first-order processes, and yield as major products benzene, triphenylsilane, and o-biphenylyl triphenylsilane (and tetraphenylsilane in the case of V). II, III, and IV decompose via second-order processes, disproportionating to corresponding higher and lower phenyl silanes, e.g., II yields I + III, III yields II + IV, and IV yields III + SiH4. VI and VIII decompose about 100C below I and yield tetraphenylsilane and what appears to be triphenylbromosilane. The following rate data were obtained for the more thoroughly studied silane pyrolyses: (I) ln k (/min) = 34.40 - 67,000/RT, T = 561-588C; (II) ln k (l/mole-min) = 49.76 - 70, 100/RT, T = 459-505C; (III) ln k (l/mole-min) = 44.99 - 55,800/RT, T = 383-419C; (V) ln k (/min) = 25.60 - 44, 700/RT, T = 465-511C. The high-frequency factors obtained for II and III, and the low-frequency factors obtained for I and V do not permit one to generalize on a single decomposition mechanism, applicable to all the arylsilanes at this time. (Author)

AD-615 562 Div. 04/4, 10/7
CFSTI Prices: HC$2.00 MF$0.50

Louvain Univ. (Belgium).
IONS PRODUCED IN CHEMICALLY REACTING SYSTEMS.
Final scientific rept.,
by A. van Tiggelen, S. de Jaegere, and L. Lowet.
May 65, 28p
Contract AF61 052 398
ARL 65-119

Unclassified report

Descriptors: (*Flames, Gas ionization), (*Photochemistry, Gas ionization), (*Gas ionization, Test methods), Flash lamps, Discharge tubes, Aliphatic compounds, Oxygen, Nitrogen compounds, Oxides, Explosions, Electrical conductance, Ions, Free radicals, Belgium.

A method for flash conductimetry in gases is described in this report. Its use in the study of chemi-ionization reactions is briefly discussed. Details are given of the apparatus used in the work reported here. Preliminary results on the conductivity observed during the explosion of a mixture of C2H2, O2 and NO2 are reported. An analysis of the conductivity-time curves obtained shows that there is a parallelism between rate of ion-formation and radical concentration (data from the literature) during the course of the explosion. A temporary conclusion of this work confirms the idea that in one flame several radical reactions may be at the origin of chemi-ionization. (Author)

AD-615 626 Div. 04/4, 02/7
CFSTI Prices: HC$2.00 MF$0.50

Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Chemistry.
CHEMILUMINESCENCE IN ATOMIC REACTIONS AT LOW PRESSURES.
Final rept. for 16 Mar 64-15 Mar 65,
by Paul Harteck, R. R. Reeves, Jr., and T. Rolfes.
20 May 65, 32p
Contract AF19 628 4069, Proj. 7635, Task 763501
AFCRL 65-253

Unclassified report

Descriptors: (*Luminescence, Chemical reactions), (*Sulfur compounds, Monoxides), (*Nitrogen, Recombination reactions), (*Upper atmosphere, Luminescence), Reaction kinetics, Thermodynamics, Oxygen, Low-pressureresearch, Emissivity.

The chemiluminescent reaction of sulfur monoxide with oxygen atoms was studied in the micron pressure region and shown to be a simple combination: S0 + 0 yields S02 + h(nu). This was analogous to the results previously obtained for the N0-oxygen atom reaction. Some thermodynamic considerations are given as well as estimated reaction rates. The results of these experiments with N0 and S0 reacting with oxygen atoms confirm the two body combination as a proable mechanism for chemiluminescence. Additional studies on the Lewis Rayleigh afterglow of nitrogen atoms were made at low pressures which indicated that a simple third order process does not dominate for the light emitting process under these conditions. (Author)

AD-615 645 Div. 04/2, 14/2, 25/2
CFSTI Prices: HC$1.00 MF$0.50

Weizmann Inst. of Science, Rehoboth (Israel).
DEPENDENCE OF SUPEREXCHANGE INTERACTION ON Fe(3+)-O(2-) - Fe(3+) LINKAGE ANGLE,
by D. Treves, M. Eibschutz, and P. Coppens.
1 Feb 65, 8p Technical note no. TN-15
Contract AF61 052 654

Unclassified report

Descriptors: (*Iron compounds, Exchange reactions), (*Symmetry (Crystallography), Iron compounds), (*Transition temperature, Iron compounds), (*Ferrites, Exchange reactions), Integrals, Crystal lattices, Crystallography, Materials, Ions.

The Neel temperature of the orthoferrites is calculated assuming a constant distance between Oxygen and Iron

ions and that the superexchange integral varies as the cosine of the linkage angle. The calculated values fit well the measured Neel temperatures which cover a range of about 120K. (Author)

AD-615 666 Div. 04/4, 04/3, 25/7, 30/2
CFSTI Prices: HC$1.00 MF$0.50

Mellon Inst., Pittsburgh, Pa.
NUCLEAR MAGNETIC RESONANCE.
Summary rept.,
by A. A. Bothner-By, C. Naar-Colin, H. Gunther, S. Castellano, and O. D. Geisel. 1965, 10p
Contract AF49 638 980
AFOSR 4709

Unclassified report

Descriptors: (*Nuclear magnetic resonance, Molecular spectroscopy), (*Molecular spectroscopy, Alkenes), (*Programming (Computers), Molecular spectroscopy), Butane, Nuclear spins, Molecular isomerism, Molecular structure, Spectrum analyzers, Matrix algebra.

A summary is given of work on: (1) the nuclear magnetic resonance spectra of ole Finic compounds; (2) rotational isomerism in 2,3-disubstituted butanes; (3) methods of analyzing nuclear magnetic resonance spectra.

AD-615 669 Div. 25/7, 04/4

Princeton Univ., N. J.
SOLVENT EFFECTS ON THE INFRARED FREQUENCY OF INORGANIC CARBONYL AND NITROSYL BANDS,
by William DeWitt Horrocks, Jr. and Richard H. Mann. 20 Jul 64, 11p
Grant AF AFOSR242 63
AFOSR 65-0689

Unclassified report

Pub. in Spectrochimica Acta v21 p399-408 1965
(Copies available only to DDC users).
Presented at the Symposium on Metal Carbonyls and Related Complexes, 147th National Meeting of the American Chemical Society, Philadelphia, 8 April 1964.

Descriptors: (*Infrared spectroscopy, Complex compounds), (*Complex compounds, Spectra (Infrared)), (*Cobalt compounds, Spectra (Infrared)), Organic solvents, Band spectrum, Frequency, Nitrogen compounds, Carbon compounds, Chemical bonds, Polarization, Dipole moments.

The infrared spectra of a number of transition metal carbonyl and nitrosyl compounds were recorded in a series of solvents. The behavior of the various bands is discussed in terms of the relative frequency shift plots of Bellamy and co-workers. The magnitude of the frequency shifts is correlated with the relative electron density around the metal atom in a series of compounds in which the ligands are varied. Solvent effects on N-O and C-O vibrators appear to be fairly similar in character, with the N-O band shift greater in magnitude. This is discussed in terms of dative metal-ligand pi-bonding in these complexes. It is found that in molecules with more than one C-O band, the frequency shifts of these bands correlate fairly well among themselves but do not correlate with those of complexes having only one C-O band. The bridging carbonyl band in Co2(CO)8 has a solvent shift behaviovery similar to organic ketones. In certain solvents, however, there is evidence for the formation of the Co(CO)4(-)anion. (Author)

AD-615 670 Div. 04/4, 04/3

Utah Univ., Salt Lake City.
INTRAMOLECULAR HYDROGEN BONDING IN cis-CYCLOPROPANEPOLYCARBOXYLIC ACIDS,
by John L. Haslam, Edward M. Eyring, William W. Epstein, Gale A. Christiansen, and Melvin H. Miles. 23 Jul 64, 6p
Grant AF AFOSR476 64
AFOSR 65-0720

Unclassified report

Pub. in American Chemical Society. Journal v87 p1-6 1965(Copies not available to DDC or Clearinghouse customers).
Presented at the National Meeting of the American Society (146th) Denver, Colo., January 22, 1964.

Descriptors: (*Carboxylic acids, Chemical bonds), (*Chemical bonds, Carboxylic acids), Monocyclic compounds, Polycyclic compounds, Spiro compounds, Reaction kinetics, Molecular properties, Dissociation, Heat of activation, Entropy, Enthalpy, Relaxation time.

Acid dissociation constants and specific rates of reaction between a base and an intramolecularly hydrogen-bonded proton in monoanions of dicarboxylic acids were determined at 10 and 25C in 0.1 M ionic strength aqueous solution for the following acids: cis-3,3-dimethylcyclopropane-1,2-dicarboxylic acid, cis-3,3-diphenylcyclopropane-1,2-dicarboxylic acid, and spiro(cyclopropane-1,9'-fluorene)-cis-2,3-dicarboxylic acid. The kinetic data obtained with the temperature-jump relaxation method permit an assignment of relative strengths of intramolecular hydrogen bonds in agreement with Ka1/Ka2 data. Rough values of E-a, enthalpy, and entropy are calculated, and their significance is considered. Kinetic data are also reported for N,N-dimethyl-o-aminobenzoic acid at 25C and cis-cyclopropane-1,2,3-tricarboxylic acid at 10 and 25C. (Author)

AD-615 674 Div. 04/4, 17/2, 25/3

Illinois Univ., Urbana. Dept. of Physics.
ELECTRICAL BEHAVIOR OF PASSIVE IRON.
Reviseded.,
by J. L. Ord and J. H. Bartlett. 14 Oct 64, 8p
Contracts DA11 022ORD3442, DA11 022ORD2525
AROD 2694:3

Unclassified report

Pub. in Journal of the Electrochemical Society v112 n2 p160-6 Feb 1965
(Copies not available to DDC or Clearinghouse customers).
Revision of manuscript submitted 7 May 62.

Descriptors: (*Iron, Electrochemistry), (*Monomolecular films, Iron), Electrostatics, Transients, Electrical properties, Acids.

From a study of the steady-state and of galvanostatic transients, it is concluded, in agreement with Vetter and Weil, (i) that there exists a layer on iron when it is passive, (ii) that an electric field drives ions through this layer, and (iii) that the resistance to the flow of these ions is nonohmic. In the steady state, the thickness of this layer varies linearly with passivating potential from about 8A to about 68A. Transition from the steady passive state to the active state can occur slowly (probably by uniform thinning) for anodic current constant and less than the steady-state value, or rapidly (probably without thinning) for cathodic currents. The results indicate that, when the system is in a nonsteady state, there is a nonzero charge distribution within the layer. Even if the steady-state current be restored, it may take a long time for this charge distribution to relax back to the neutral steady state. (Author)

AD-615 676 Div. 04/2, 04/4, 25/2

Wisconsin Univ., Madison. Dept. of Chemistry.
THE MOLECULAR STRUCTURE OF A TRICYCLIC

COMPLEX, (SFe(CO)3)2,
by Chin Hsuan Wei and Lawrence F. Dahl. 20 Jul 64, 12p
Grant AF AFOSR518 64, Proj. 9710, Task 971001
AFOSR 65-0681

Unclassified report

Pub. in Inorganic Chemistry v4 n1 p1-11 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Complex compounds, Molecular structure), (*Sulfur compounds, Complex compounds), (*Iron compounds, Complex compounds), (*Crystal lattices, Complex compounds), Carbon compounds, Chemical bonds, Crystal structure, Polycyclic compounds, Heterocyclic compounds, Anisotropy, Symmetry (Crystallography), Atomic orbitals, X-ray diffraction analysis, Single crystals.

A three-dimensional single-crystal X-ray determination of (SFe(CO)3)2 revealed the first known example of a transition metal mu-dithio complex with a disulfide group symmetrically bonded to two iron tricarbonyl fragments. The structure thereby represents a new type of transition metal carbonyl complex in which two bonding metals and two nonmetal bridging groups are fused along the bridged atoms to give a heterotricyclic system containing four three-membered rings. The compound contains two dimeric molecules in a triclinic unit cell. An analysis of structure and bonding is given and a comparison is made of the molecular configuration of (SFe(CO)3)2 with that of (C2H5SFe(CO)3)2.

AD-615 679 Div. 25/7

Electronics Research Lab., Univ. of California, Berkeley.
USE OF MICROWAVE TECHNIQUES FOR THE DETERMINATION OF BOUND WATER,
by Paul O. Vogelhut. 1964, 4p
Contract Nonr22292

Unclassified report

Pub. in Nature v203 n4950 p1169-70 Sep 12 1964 (Copies available only to DDC users).

Descriptors: (*Molecular structure, Water), (*Water, Molecular structure), (*Microwave spectroscopy, Water), X band, Microwave frequency, Cavity resonators, Dielectric properties.

AD-615 684 Div. 25/7

California Univ., San Diego. Dept. of the Aerospace and Mechanical Engineering Sciences.
APPROXIMATIVE BAND ABSORPTION AND TOTAL EMISSIVITY CALCULATIONS FOR H2O,
by S. S. Penner and P. Varanasi. 27 Sep 64, 12p
Contract Nonr221600, Proj. NR015 401

Unclassified report

Pub. in Journal of Quantitative Spectroscopy and Radiative Transfer v5 p391-401 1965 (Copies available only to DDC users).

Descriptors: (*Water vapor, Emissivity), (*Emissivity, Water vapor), (*Absorption spectrum, Water vapor), Band spectrum, Molecular spectroscopy, Heat transfer.

A highly simplified procedure, utilizing symmetrical band contours and intensity estimates derived from harmonic oscillator approximations, may be used to calculate band emissivities for H2O at sufficiently high pressures where the rotational fine structure has been removed. Agreement with experimental data is excellent. The empirically determined dependence of total emissivities on the partial pressure of water vapor, at constant total pressure, may be accounted for quantitatively by using a model of randomly distributed dispersion lines falling in the square root region of the curves of growth. (Author)

AD-615 687 Div. 25/7, 04/4

Frick Chemical Lab., Princeton Univ., N. J.
ISOTROPIC PROTON RESONANCE SHIFTS OF SOME BIS-(TRIARYLPHOSPHINE) COMPLEXES OF COBALT (II) AND NICKEL (II) DIHALIDES,
by Gerd N. La Mar, William DeW. Horrocks, Jr., and Leland C. Allen. 27 May 64, 9p
Grant AF AFOSR242 63
AFOSR 65-0688

Unclassified report

Pub. in Journal of Chemical Physics v41 n7 p2126-34 Oct 1 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Complex compounds, Nuclear magnetic resonance), (*Phosphines, Complex compounds), (*Nickel compounds, Complex compounds), (*Cobalt compounds, Complex compounds), (*Nuclear magnetic resonance, Complex compounds), Protons, Absorption spectrum, Nuclear spins, Halides, Atomic orbitals, Hyperfine structure, Polycyclic compounds.

Isotropic proton resonance shifts were observed for some bis-(triarylphosphine) complexes of cobalt(II) and nickel(II) dihalides. The equations for the pseudocontact shifts were extended to include these complexes which possess g tensors with C2v symmetry. The isotropic shifts for the nickel complexes are interpreted as arising solely from a contact interaction with unpaired spin in the pi orbital of the ligand. Based on the postulate that unpaired spin will distribute itself in the same way in a given ligand whether attached to cobalt or nickel, the shifts for the cobalt complexes are separated into contact and pseudocontact contributions. The relative magnitudes of the pseudocontact shifts correspond well with the expected relative strength of the C2v distortion of the tetrahedral ligand field of the cobalt complexes. The evaluation of the proportionality constant, between the unapired spin density and the hyperfine interaction constant for the methyl-substituted complexes demonstrates the consistency of the interpretation of the shifts. The difference in the unpaired spin densities on the cobalt and nickel complexes is explained by slightly greater interelectronic pulsion in the t orbitals of the nickel complexes. (Author)

AD-615 688 Div. 04/3

Tulane Univ., New Orleans, La. Dept. of Chemistry.
PHOTOISOMERIZATION OF CYCLOPROPANE DERIVATIVES. PHOTOINTERCONVERSION OF PROPENES AND CYCLOPROPANES,
byG. W. Griffin, J. Covell, R. C. Petterson, R. M. Dodson, and G. Klose. 3 Oct 64, 2p
AROD 4375:3

Unclassified report

Pub. in American Chemical Society. Journal v87 p1410 1965 (Copies not available toDDC or Clearinghouse customers).
Prepared in cooperation with Loyola Univ., New Orleans, La. and Minnesota Univ., Minneapolis.

Descriptors: (*Monocyclic compounds, Molecular isomerism), (*Photochemistry, Monocyclic compounds), (*Alkenes, Photochemistry), (*Molecular isomerism,

Monocyclic compounds), Stereochemistry, Chemical compounds, Ketones, Polycyclic compounds, Chromatographic analysis.

AD-615 690 Div. 25/7, 30/2

Lockheed Missiles and Space Co., Palo Alto, Calif. Physical Sciences Lab.
SPECTRAL ABSORPTION IN HEATED AIR,
by D. R. Churchill and R. E. Meyerott. 1964, 19p
Contracts DA49 146XZ198, Nonr336800
Unclassified report

Pub. in Journal of Quantitative Spectroscopy and Radiative Transfer v5 p69-86 1965 (Copies available only to DDC users).

Descriptors: (*Air, Absorption spectrum), (*Absorption spectrum, Air), (*Programming (Computers), Absorption spectrum), Wave transmission, Band spectrum, Quantum mechanics, Molecular spectroscopy, Diatomic molecules, Nitrogen, Oxygen compounds, Nitrogen compounds, Vibration, Molecular rotation.

Several molecular band systems, which contribute appreciably to the absorption coefficient of heated air, have been theoretically reconstructed with the aid of a series of digital computer programs. Experimental spectroscopic results have been used in these programs whenever such results are available. The band systems are generated on a line-by-line basis up to high rotational quantum numbers, and then stored on magnetic tapes. The tapes are then used by other programs to compute absorption coefficients. Previous results are briefly summarized and two recently treated band systems are discussed: the Birge-Hopfield No. 1 system of N2 and the vibration-rotation bands of NO. (Author)

AD-615 692 Div. 04/3, 04/4

Newcastle-Upon-Tyne Univ. (England).
HETEROCYCLIC ORGANOBORON COMPOUNDS. PART III. SYNTHESIS OF PHENYLBORACYCLOPENTANE AND THE INFRARED SPECTRA OF THIS AND OTHER PHENYLBORON COMPOUNDS,
by N. N. Greenwood and J. C. Wright. 15 Apr 64, 6p
Grant AF EOAR62 27, Proj. 9710, Task 971002
AFOSR 65-0692
Unclassified report

Pub. in Journal of the Chemical Society v70 p448-53 Jan 1965 (Copies available only to DDC users).

Descriptors: (*Organoboranes, Synthesis(Chemistry)), (*Spectra (Infrared), Organoboranes), (*Heterocyclic compounds, Organoboranes), Fluorides, Amines, Lithium compounds, Molecular structure, Band spectrum, Great Britain.

An improved synthesis of phenylboracyclopentane by the reaction of phenylborane-triethylamine with butadiene is reported, but the preparation of this compound from phenylboron difluoride and 1,4-dilithiobutane could not be confirmed. The infrared spectrum of phenylboracyclopentane is analysed in detail and shown to be consistent with the proposed structure. The spectra of phenylboron difluoride and phenylborane-triethylamine are also recorded and assignments made. (Author)

AD-615 694 Div. 25/7

New York State Univ., Stony Brook.
FURTHER EVIDENCE FOR THE NORMAL CYANIDE STRUCTURE OF GeH3CN,
by Theodore D. Goldfarb and Barbara P. Zafonte.
22 Jul 64, 1p
Grant AF AFOSR277 63
AFOSR 65-0687
Unclassified report

Pub. in Journal of Chemical Physics v41 n11 p3653-4 Dec 1 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Germanium compounds, Cyanides), (*Molecular structure, Germanium compounds), (*Cyanides, Molecular structure), Deuterated compounds, Isotopes, Frequency shift.

Preparations were made of 58% C(13)- and 98% N(15)-substituted GeH3CN and GeD3CN, and the vibrational frequency shifts that were producedby these isotopic substitutions were observed. These actions were taken to confirm the assignment of the normal cyanide structure to the product of the reaction of germyl iodide with silver cyanide. The frequencies of GeH3CN and GeD3CN observed were used to calculate a separate set of stretching force constants for each molecule which were then used to compute the frequencies of the C- and N-substituted species. The CN shifts can be measured in GeD3CN to better than ± 1/cm and provide evidence of the normal cyanide structure of the germyl cyanide molecule. The GeH3 stretching fundamentals overlap the region of large calculated shifts of the CN frequency and result in uncertainty in the N(15) shift and prevent an estimate of the C(13) shift.

AD-615 696 Div. 25/7, 04/3, 04/4

Pennsylvania State Univ., University Park.
POLARIZATION OF NEAR ULTRAVIOLET ABSORPTION AND PHOSPHORESCENCE OF AROMATIC KETONES,
by V. G. Krishna. 30 Sep 63, 10p
Grant AF AFOSR62 39
AFOSR 65-0690
Unclassified report

Pub. in Journal of Molecular Spectroscopy v13 n3 p296-304 Jul 1964 (Copies not available to DDC or Clearinghouse customers).
Research supported in part by Office of Naval Research, Washington, D. C., and done in cooperation with Florida State Univ., Tallahassee.

Descriptors: (*Aromatic compounds, Ketones), (*Ketones, Atomic energy levels), (*Ultraviolet spectroscopy, Ketones), (*Phosphorescence, Ketones), Polarization, Electron transitions, Probability, Absorption spectra, Atomic orbitals, Nuclear spins, Band spectrum, Emissivity.

Polarizations of the phosphorescence (T-1 to S-0) relative to the lowest n to pi* and pi to pi* absorption were investigated in acetophenone, benzophenone, and anthrone. The results indicate that the lowest triplet state is an (n, pi*) state, the lowest singlet state is a 1-U state, and that the lowest (pi, pi*) state can be described analogous to 1-Lb state in aromatic hydrocarbons. The 1-A to 1-U transition is allowed by the mixing of the 1-U state with (pi, pi*) states of A-1 symmetry. In acetophenone and benzophenone the mixing of 1-U with 1-W also contributes to the 1-A to 1-U transition probability. (Author)

AD-615 701 Div. 25/7, 25/4

Biophysics Lab., Stanford Univ., Calif.
THERMOLUMINESCENCE OF L-TYROSINE UNDER U.V. IRRADIATION,

by M. Weissbluth, R. E. Steele, and E. P. Day.
10 Jun 64, 12p Rept. no. BL-108
Contract Nonr22536

Unclassified report

Pub. in Photochemistry and Photobiology v4 p147-58 1965
(Copies available only to DDC users). See also AD-615 194.

Descriptors: (*Tyrosine, Luminescence), (*Luminescence, Tyrosine), (*Ultraviolet radiation, Tyrosine), Electron transitions, Excitation, Atomic energy levels, Temperature.

The thermoluminescence of polycrystalline L-tyrosine kept at 77K during irradiation by u.v. light has been investigated. On the basis of action spectra, emission spectra, and decay kinetics, a phenomenological model is proposed in which the final radiative transition is from the lowest triplet to the ground singlet state of the molecule. The role of metal ions in trace amounts, various gases in contact with the sample, and a bleaching effect by white light were also studied. (Author)

AD-615 704 Div. 04/3, 16/3

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
BEHAVIOR OF UNSATURATED FATTY ACIDS IN THE THIOBARBITURIC ACID TEST AFTER RADIOLYSIS, by L. D. Saslaw and V. S. Waravdekar. 11 Sep 64, 15p

Unclassified report

Pub. in Radiation Research v24 n3 p375-89 Mar 1965
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Fatty acids, Radiation chemistry), (*Radiation chemistry, Fatty acids), Barbiturates, Acids, Chemical analysis, Linolenic acid, Linoleic acid, Ultraviolet radiation, Gamma rays, Chemical indicators, Biochemistry.

Irradiation of linolenic acid and arachidonic acid results in production of several chromatographically distinguishable thiobarbituric acid (TBA)-active compounds. The ultraviolet radiation-induced oxidation of the fatty acids is also characterized by increased absorption at 225 millimicrons and a positive benzidine test. Chromatographically different TBA-active products were obtained, depending on the radiation and the substrate employed. Despite the similarity of chromogen solutions obtained from the TBA-active products to that obtained from malonaldehyde, the presence of malonaldehyde among the products after either process of irradiation was not evident. After resolution of the TBA-active products on thin-layer chromatoplates, the TBA-active sites were observed to react with benzidine but did not liberate iodine from potassium iodide. In each irradiation process, the production of TAB-active compounds was accompanied by peroxide formation. However, the TBA-active compounds are not of a peroxide nature. Inasmuch as the TBA-active compounds react with standard reagents for detection of the carbonyl function, the TBA test must be regarded as a test for unidentified carbonyl compounds. (Author)

08. Earth Sciences and Oceanography

AD-615 210 Div. 02/9

Marine Lab., Univ. of Miami, Coral Gables, Fla.
A STUDY OF PRODUCTION IN THE GULF OF MEXICO,
by J. H. Steele. 1964, 14p
Contract Nonr84001

Unclassified report

Pub. in Journal of Marine Research v22 n3 p211-22 Sep 15 1964 (Copies available only to DDC users).

Descriptors: (*Chlorophylls, Mexico Gulf), (*Mexico Gulf, Chlorophylls), Tropical regions, Marine biology, Plants (Botany), Photosynthesis, Carbon.

Theoretical reasons are given to show that midwater chlorophyll maxima may be due to an increase in the chlorophyll content of the plants rather than to an accumulation of plants due to sinking. Data from the Gulf of Mexico are used to support this explanation. (Author)

AD-615 244 Div. 02/10
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
TILTMETER OBSERVATIONS AT THE 'APATITY' SEISMIC STATION IN 1959-1960,
by G. D. Panasenko. 29 Apr 65, 16p
FTD-TT-64-1262
TT 65-62244

Unclassified report

Unedited rough draft trans. of mono. Sovremennye Dvizheniya Zemnoi Kory: Sbornik Statei (Recent Crustal Movements) v1 Moscow, 1963, p202-10.

Descriptors: (*Geology, Baltic sea), (*Seismological stations, Geology), USSR, Periodic variations, Temperature, Earth, Surfaces, Motion, Seismic waves.

On the basis of the inclination data obtained at the Apatiti seismic station by an azimuth installation that consists of a number of the H - VI type inclination meters there have been observed some periodic variations of the earth surface inclinations and a linear component apriorily related in its main part to the 'secular' course. The daily inclination course is generally small and does not exceed 0.04 sec of arc. In some cases semi-diurnal inclinations not exceeding 0.002 sec. of arc may be distinguished against the background of the daily course. The annual inclination course of 1960 along the N--S component is 2.6 sec. of arc and along the W--E is 0.7 sec. of arc. Against the background of the annual course there may be strictly distinguished a wave of inclinations with a period of 4.0--4.5 months and an amplitude of about 1.3 sec. of arc along the N--S and nearly 0.35 sec of arc along the W--E. In the upheaval azimuth of 339 degrees, which is directed towards the uplift of the earth's crust, the 'secular' inclination course of 1960 comprises 6.56 sec of arc. (Author)

AD-615 277 Div. 02/8
CFSTI Prices: HC$3.00 MF$0.75

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
EXPERIMENTAL RESEARCH ON DESICCATION CRACKS IN SOIL.
Final rept.,
by Arturo Corte and Akira Higashi. Dec 64, 83p
Research rept. no. RR-66
Projs. 8 66 02 400, 22 3 4
PB 159 056 superseded

Unclassified report

Rept. on Model Studies of Patterned Ground. Supersedes rept. dated Aug 60.

Descriptors: (*Soils, Fracture (Mechanics)), (*Fracture (Mechanics), Soils), Model tests, Soil mechanics, Rock (Geology), Moisture, Vaporization.

The final report on model studies of patterned ground deals with a theory proposed for crack formation by soil desiccation. Experimental procedures and results are described in reproducing desiccation cracks under controlled conditions for soil with and without stones. The crack pattern and number of cell sides are more dependent on thickness of the soil sample and the bottom container material than temperature or humidity and show a cell area of log normal size distribution. Cracking was found to begin from the center and extend to the surface or bottom with non-uniform speed. The shape, size, porosity, and depth of scattered stones affect the initiation of cracks but do not relate to geometry and mean area of cells. Soil 'habituation' to crack in the same manner is promoted by complete soil soaking and stone admixing. Surface stones affect 'habituation' differently. Sorting of particles into desiccation cracks requires 'habituation.' This is accomplished if the soil is soaked and dried repeatedly under wind and rain without vegetation. Areas above the timber line in cold environments have the proper conditions for sorting into desiccation cracks. The unusual phenomena called 'wetting cracks,' produced during wetting, and sorting into wetting cracks are mentioned. Factors which promote or hinder sorting into desiccation cracks are indicated. (Author)

AD-615 282 Div. 02/5
CFSTI Prices: HC$2.00 MF$0.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
GLACIOLOGICAL STUDIES IN THE VICINITY OF CAMP CENTURY, GREENLAND,
by Steven J. Mock. Mar 65, 26p
Research rept. no. RR-157
Task 1V014501B52A31

Unclassified report

Descriptors: (*Glaciers, Greenland), (*Snow, Greenland), Ice islands, Thickness, Determination, Seismology, Terrain, Mapping.

A series of pit studies was made across the Thule Peninsula in the vicinity of Camp Century. Mean annual accumulation was found to range from 16.2 g/sq. cm to 60.3 g/sq. cm, decreasing linearly with distance from moisture source area. The Thule Peninsula was found to create a pronounced precipitation shadow. The mean annual temperature as determined by 10-m snow temperatures decreased 1.2C/100-m rise in elevation. Seismic and elevation determinations indicate that Camp Century is at an elevation of 1885 m and is underlain by approximately 1380 m of ice. (Author)

AD-615 287 Div. 02/6
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CAN WE DETECT GRAVITATIONAL WAVES,
by M. A. Korets. 23 Apr 65, 10p

FTD-TT-64-1238
TT 65-62275

Unclassified report

Unedited rough draft trans. of Priroda (USSR) v53 n7 p106-8 1964.

Descriptors: (*Gravity, Experimental data), Measurement, Propagation, USSR.

AD-615 315 Div. 02/9
CFSTI Prices: HC$0.50 MF$0.50

Naval Research Lab., Washington, D. C.
POSTULATED ANOMALOUS DISSOLVED ATMOSPHERIC GAS CONCENTRATION IN THE ARCTIC OCEAN.
Interim rept.,
by D. D. Williams and R. R. Miller. 19 Apr 65, 9p
Rept. no. NRL-6249
Proj. RR001 01 43 4756

Unclassified report

Descriptors: (*Arctic Ocean, Gas analysis), (*Gas analysis, Arctic Ocean), (*Sea water, Gases), Nitrogen, Oxygen, Oceanology, Ocean currents, Test methods.

The possibility of anomalous concentrations of dissolved atmospheric gas in certain Arctic Ocean waters is theorized. The unique geometry of the Arctic Basin and its permanent ice cover create a gigantic 'zone-refiner' that could lead to this condition. The application of a previously developed NRL instrument to an investigation of this phenomenon is indicated and recommended. (Author)

AD-615 340 Div. 02/9, 30/5
CFSTI Prices: HC$0.50 MF$0.50

Naval Research Lab., Washington, D. C.
SUBMARINE APPLICATION OF GAS CHROMATOGRAPHY FOR THE ANALYSIS OF DISSOLVED GASES IN SEA WATER.
Interim rept.,
by D. D. Williams and R. R. Miller. 20 Apr 65, 10p
Rept. no. NRL-6245
Proj. RR001 01 43 4756

Unclassified report

Descriptors: (*Sea water, Chromatographic analysis), (*Chromatographic analysis, Sea water), Submarines, Instrumentation, Gas analysis, Oxygen, Nitrogen, Carbon dioxide, Oceanography, Test methods.

The instrument developed at NRL for the continuous stripping and periodic analysis of dissolved gases in water has undergone a very successful 'sea trial' aboard an operating submarine. No unforeseen difficulties were experienced in the transition from laboratory to field operation. While the purpose of the test was not for collection of specific oceanographic data, the results correlate well with literature predictions for the ocean area surveyed. The equipment should have value for the routine collection of profile data on gases contents in the coming generation of submersible research vessels. (Author)

AD-615 392 Div. 02/4, 06/6
CFSTI Prices: HC$3.00 MF$0.75

Harry Diamond Labs., Washington, D. C.
ELECTRONIC SURVEY SYSTEM.
Final rept.,
by Robert S. Goodman. 30 Mar 65, 76p
Rept. no. TR-1278
Projs. DA1A250206D24003, 62300

Unclassified report

Descriptors: (*Surveying, Radio beacons), (*Radio beacons, Surveying), Mapping, Radio transmission, Feasibility studies, Detectors.

The feasibility of developing an electronic survey system to determine the positions of locators within a circular area of 10 mi diam was studied. An accuracy of 2 1/2 ft is required of the system. The system analyzed has four reference stations (three slave transponders and a master command station) and portable locators (free-running pulse transmitters) as necessary. The locators are interrogated by the master station and their position is computed in real time. The computation is essentially a computation of the intersection of two hyperbolas. The design of a system with available components is described, but analysis indicates that errors of 5 to 8 ft can be expected. Analysis of the characteristics of electromagnetic propagation near the ground indicate that errors due to transmission irregularities can be adequately eliminated. Although some improvements in accuracy might be expected by using improved components, the improvement would not be adequate for this application without high accuracy in positioning reference stations. (Author)

AD-615 457 Div. 12/5, 13/4
CFSTI Prices: HC$5.00 MF$1.00

Davisson (M. T.), Foundation Engineer, Champaign, Ill.
STATIC AND DYNAMIC COMPRESSIBILITY OF SUFFIELD EXPERIMENTAL STATION SOILS.
Rept. for Feb-Sep 64,
by M. T. Davisson and T. R. Maynard. Apr 65, 156p
Contract AF29 601 6352, Proj. 5710, Task 13 144
WL TR-64-118

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Soil mechanics, Tests), Compressive properties, Airburst, TNT, Soils, Canada.

Static and dynamic one-dimensional compression tests were performed on each of ten 5-inch undisturbed shelby tube soil samples taken from the site of Operation Snowball at the Suffield Experimental Station. The maximum stresses attained were generally in the 390 to 1,300 psi range. The results of the tests are presented in the form of plots of axial stress versus axial strain, constrained modulus versus axial stress, and radial stress versus axial stress. The dynamic modulus observed for the upper 13 feet of the soil profile has a minimum value of approximately 3,000 psi, and is approximately twice the static value. Between the depths of 13 feet and 23 feet, moduli values ranging from 18,000 to 24,000 psi are applicable at the 100 psi stress level. Below a depth of 23 feet, the estimated water level, the constrained modulus is considered equal to that of water--300,000 psi. An air-blast-induced ground motion prediction was made for a range of 250 feet from a 500-ton TNT explosion. A peak transient surface displacement of 4.6 inches was computed for a time of 39 milliseconds after arrival of the shock front at the ground surface. Because of differences between the laboratory and field loading histories, and the strain rate sensitivity of the soil, the computed displacement is probably from 50 to 100 percent of the actual displacement. (Author)

AD-615 511 Div. 02/5, 13/4

Army Engineer Waterways Experiment Station, Vicksburg, Miss.
AN EXPERIMENTAL STUDY OF ARCHING IN SAND.
Doctoral thesis,
by James Walsh McNulty. May 65, 190p
Technical rept. no. TR-1-674
Task 13 010

Unclassified report

Available from Waterways Experiment Station, Vicksburg, Miss., $2.00.

Descriptors: (*Soil mechanics, Sand), (*Sand, Load distribution), Loading (Mechanics), Deformation, Stresses, Strain (Mechanics), Structures, Underground structures.

Arching, the ability of a material to transfer load from one area to another in response to relative displacements between areas, is investigated. The study is primarily experimental, results being used to assess the applicability of existing theories. The major experimental results are a series of dimensionless load-deflection curves obtained by moving an axially symmetrical trapdoor, which was initially mounted flush with the bottom of a cylindrical test chamber, up into or down away from a series of sand specimens of various depths. The sand surface was subjected to several levels of pneumatic surcharge (40, 75, 100 psi), the majority being at 75 psi. Two sands and two trapdoor sizes were used. Also the redistribution of vertical stress on the test chamber base was measured by several pressure cells located at various distances from the trapdoor. Analysis of the dimensionless load-deflection data leads to the conclusions that extremely small deflections have great significance, a deflection as small as 0.0002 times the trapdoor diameter may change the load on the trapdoor by as much as 50%; that the trapdoor size is not important if the ratio of depth of soil to diameter (H/B) is held constant; that the influence of the H/B ratio on the shape of the dimensionless load-deflection curves is very significant for small values of H/B (H/B less than 2); that for values of H/B larger than 2, shape of the dimensionless load-deflection curve does not change much with H/B for values of deflection in the range of practical interest.

AD-615 540 Div. 02/9
CFSTI Prices: HC$1.00 MF$0.50

Texas A and M Univ., College Station. Dept. of Oceanography and Meteorology.
DEPTH OF SENSORS FIXED TO A TOWED CHAIN,
by Dale F. Leipper. May 65, 19p Ref-65-13T
Contract Nonr211904, Proj. 286

Unclassified report

Descriptors: (*Oceanographic equipment, Towed bodies), (*Thermistors, Oceanographic equipment), (*Depth finding, Oceanographic data), Oceanographic vessels, Cables (Mechanical), Temperature, Monitors, Maps.

One important piece of scientific equipment now in use on oceanographic research vessels is the thermal-tow, an instrument which utilizes a faired cable (267 meters long on the Texas A and M University vessel ALAMINOS) with thermistors attached at 7.6 meter intervals and with a pressure (or depth) transducer at the end of the chain. The cable may be towed at speeds up to approximately ten knots and data are recorded automatically in several forms in the ship laboratory. As ship speed, wind, ocean current, sea state and other conditions change, the depth attained by the 267 meter cable changes. Thus, the thermistors (or other sensors) affixed to the chain also change depth and a way must be found to determine the depth at which each is functioning. On ALAMINOS Cruise 64-A-7, May, 1964, data were collected from which a depth determination chart was developed. The nature of this chart and its practical application are the subject of this presentation. In brief, the chart is a set of scales such that, given the depth reading from the chain end, the depth associated with any particular point along the chain length may be read off. (Author)

AD-615 551 Div. 02/9
CFSTI Prices: HC$2.00 MF$0.50

Naval Oceanographic Office, Washington, D. C.
LONG-RANGE ICE OUTLOOK, EASTERN ARCTIC (1965).
Apr 65, 27p Special pub. no. SP-60(65)

Unclassified report

Descriptors: (*Arctic Ocean, Ice), (*Ice, Arctic Ocean), Ice islands, Newfoundland (Province), Baffin Island, Greenland Sea.

An outlook of expected sea ice conditions in the eastern North American Arctic is presented for the period mid-May through mid-August 1965. Oceanographic and climatic data for the Eastern Arctic were analyzed in terms of sea ice growth during the past winter. These analyses, combined with the observed ice conditions for the period 25 March through 6 April, and a comprehensive study of historical ice and climatic information formed the basis for the 1965 Ice Outlook. Evaluation of this information indicate, that present ice conditions in the Labrador Sea and along the Newfoundland Coast are similar to those observed in 1957 and 1962. Although the ice is quite heavy in Baffin Bay, 1957 appears to be an analogous year for that area. Goose Bay and Kulusuk are expected to open for escorted shipping later than normal, whereas Thule, Sondre Stromfjord, and Ikivdleq should have nearly normal opening dates. In terms of the 1964 ice season, Goose Bay will open two to three weeks later than last year, Sondre Stromfjord and Ikivdleq about the same as last year, and Thule about one month earlier than in 1964. Kulusuk will open about one week later than last year. (Author)

AD-615 552 Div. 02/5
CFSTI Prices: HC$3.00 MF$0.75

National Academy of Sciences-National Research Council, Washington, D. C. Ad Hoc Committee on Geography.
THE SCIENCE OF GEOGRAPHY.
1965, 88p Pub. no. 1277

Unclassified report

Descriptors: (*Geography, Scientific research), Climatology, Culture, Political science.

The central section of the report attempts to analyze the interests and competences among geographers that contribute to inter-disciplinary progress in studying the great man-environment system. This analysis is presented in the form of discussions of four different problem areas considered illustrative of the growing edge of geography. The four problem areas are: physical geography, cultural geography, political geography, and location theory. Within each problem area one or more research clusters are found. These are

groups with common research interests whose members habitually communicate with one another. For each problem area the Committee evaluates the significance of present and foreseeable research problems, the connection of current working problems with the great overriding problem of man and environment, the relation of the problem area to growing edges in other sciences, and research opportunities considered to be unfulfilled. (Author)

AD-615 621 Div. 02/10, 15/2
CFSTI Prices: HC$1.00 MF$0.50

Saint Louis Univ., Mo.
STATISTICAL EVALUATION OF THE FOCAL MECHANISM SOLUTIONS FOR THIRTY-SIX 1962 EARTHQUAKES,
by G. A. Bollinger and William Stauder. 1964, 20p
Grant AF AFOSR62 458
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Earthquakes, Statistical data), (*Seismic waves, Propagation), Statistical processes, Seismology.

The S Wave Project for Focal Mechanism Studies recently completed a study of thirty-six of the larger magnitude earthquakes that occurred during 1962. Well-determined solutions employing a double-couple model were obtained for twenty-three of these shocks and tentative solutions for the remaining thirteen. This study attempts to specify the agreement between the observed data (direction of first motion of the P wave and polarization angle of the S wave) and the theoretical values of these data as implied by the focal mechanism solutions obtained. To describe the agreement between observed and theoretical P wavepatterns, a P Wave Agreement Factor (PAF) is defined and applied to each of the well-determined focal mechanism solutions. The PAF, with a range of zero to four, attempts to specify both the adequacy and consistency of the P wave data by accounting for the number of quadrants of data and by weighting each data point with respect to its distance from nodal lines.

AD-615 623 Div. 02/8, 14/2
CFSTI Prices: HC$2.00 MF$0.50

Lamont Geological Observatory, Palisades, N. Y.
THE PRESSURE DERIVATIVES OF THE SOUND VELOCITIES OF POLYCRYSTALLINE MAGNESIA,
by Orson L. Anderson and Edward Schreiber.
1965, 28p
Contract AF49 638 1355
Unclassified report

Descriptors: (*Acoustic properties, Minerals), (*Magnesium compounds, Oxides), (*Equations of state, Magnesium compounds), Oxides, Pressure, Sound, Velocity, Ultrasonic radiation, Crystals, Geology.

AD-615 641 Div. 02/9, 31/5
CFSTI Prices: HC$7.75 MF$2.25

Michigan Univ., Ann Arbor.
INTERNATIONAL SEMINAR ON THEORETICAL WAVE-RESISTANCE, UNIVERSITY OF MICHIGAN, ANN ARBOR, MICHIGAN, AUGUST 19-23, 1963. VOLUME I,
ed. by F. C. Michelsen. Oct 64, 471p
Unclassified report

Supported in part by the Office of Naval Research and National Science Foundation, Washington, D. C.

Descriptors: (*Ocean waves, Mechanical properties), (*Water waves, Mechanical properties), Symposia, Theory, Hulls (Marine), Ships, Ships (Nonmilitary), Ship hulls, Motion, Measurement, Hydrodynamic configurations, Distribution, Photographic analysis.

Contents:
On problems of wave resistance research
Non-bulbous hull forms derived from source distribution on the vertical rectangular plane
Theoretical and experimental study of wave-making resistance of ships
On free waves
A comparison of the calculated and measured free-wave spectrum of an inuid in steady motion
An appraisal of the ship resistance problem in the light of measurements of the wave pattern
The determination of wave resistance from wave measurements alonga parallel cut
The XY method of determination of ship wave resistance from the wave pattern
Wave resistance obtained from photogrammetical analysis of the wave pattern.

AD-615 642 Div. 02/9, 31/5
CFSTI Prices: HC$7.55 MF$2.25

Michigan Univ., Ann Arbor.
INTERNATIONAL SEMINAR ON THEORETICAL WAVE-RESISTANCE, UNIVERSITY OF MICHIGAN, ANN ARBOR, MICHIGAN, AUGUST 19-23, 1963. VOLUME II,
ed. by F. C. Michelsen. Oct 64, 453p
Unclassified report

Supported in part by the Office of Naval Research and National Science Foundation, Washington, D. C.

Descriptors: (*Ocean waves, Mechanical properties), (*Water waves, Mechanical properties), Symposia, Theory, Ships, Ships (Nonmilitary), Hulls (Marine), Ship hulls, Tables, Hydrodynamic configurations, Model basins, Surface properties, Integral transforms, Velocity, Motion, Polynomials, Distribution, Linear systems, Equations.

Contents: Trial calculation of a hull form of decreased wave resistance by method of steep descent; analysis of wave profile alongside the ship; mathematical tables for determiningwave profiles; design of ship model basins with special reference to 'wave analysis' work; determination of wave-making resistance from surface-profile measurements; wave resistance of a partly immersed axisymmetric body; Fourier transform method for calculating wave-making resistance from wave height on a line parallel to a ship's track; motion of a ship in restricted water; Vossers' integral; velocity potential and wave resistance from motion of a slender ship; linear theories for ship motion; energy relation for wave resistance of ships in a seaway; application of Friederichs' technique to the ship problem; slender body theory; thin-ship theory; wave resistance forpolynomial centerplane singularity distributions; wave-free distributions and their applications.

AD-615 643 Div. 02/9, 35/5
CFSTI Prices: HC$7.50 MF$2.25

Michigan Univ., Ann Arbor.
INTERNATIONAL SEMINAR ON THEORETICAL WAVE-RESISTANCE, UNIVERSITY OF MICHIGAN, ANN ARBOR, MICHIGAN, AUGUST 19-23, 1963. VOLUME III,
ed. by F. C. Michelsen. Oct 64, 446p
Unclassified report

Supported in part by the Office of Naval Research and National Science Foundation, Washington, D. C.

Descriptors: (*Ocean waves, Mechanical properties), (*Water waves, Mechanical properties), Symposia, Theory, Ships, Ships (Nonmilitary), Hydrodynamic configurations, Hulls (Marine), Ship hulls, Distribution, Cargo ships, Destroyers, Boundary layer, Viscosity, Design, Models (Simulations).

Contents: Ships of minimum total resistance
Some aspects of the problem of minimum wave-resistance
On the minimum wave resistance of ships with infinite draft
Experiments on theoretical ship forms of least wave resistance
On ships with zero and small wave resistance
Calculation of the wave resistance of a ship represented by sources distributed over the hull surface
On the relations between a practical ship-hull form and an attempted singularity distribution
Fishing boat of the waveless hull form
A high-speed cargo liner design based upon the 'with-bulb' waveless concept
An application of the waveless theory to the design of a destroyer form
Interaction between ship waves and boundary layer
Effects of viscosity on wave resistance
On the determination of the wave resistance of a ship model by an analysis of its wave system.

AD-615 657 Div. 02/8, 25/8
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
ON THE THERMODYNAMICS OF CALCITE.
Memo.,
by F. J. Krieger. May 65, 35p Rept. no. RM-4590-PR
Contract AF49 638 700

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Calcite, Thermodynamics), Enthalpy, Entropy, Temperature, Pressure, Molecular weight, Vaporization, High-temperature research, High-pressure research.

The thermodynamics of calcite, CaCO3, are investigated over a range of temperatures up to 6000 K and pressures up to 100,000 atmospheres. Two sets of equilibrium composition equations are used--one representing a pure gas phase, the other a heterogeneous system of gas and condensed (i.e., solid or liquid) calcia, CaO. The gas phase of the heterogeneous chemical system, like the homogeneous gas phase, comprises 13 gaseous calcium-carbon-oxygen species. The results of the computational program are presented in both tabular and graphic form. The latter is a conventional Mollier diagram in which specific enthalpy is plotted against specific entropy, with cross plots of temperature, pressure, and molecular weight. (Author)

AD-615 667 Div. 02/9

National Inst. of Oceanography, Godalming (England).
RADIATION STRESSES IN WATER WAVES; A PHYSICAL DISCUSSION WITH APPLICATIONS,
by M. S. Longuet-Higgins and R. W. Stewart.
17 Jun 64, 32p

Unclassified report

Pub. in Deep-Sea Research v11 p529-62 1964 (Copies available only to DDC users). Preparedin cooperation with British Columbia Univ. (Vancouver).

Descriptors: (*Water waves, Momentum), (*Momentum, Water waves), Gravity, Oceanology, Stresses, Ocean currents.

The radiation stresses in water waves play an important role in a variety of oceanographic phenomena, for example in the change in mean sea level due to storm waves (wave 'set-up'); the generation of 'surf -beats'; the interaction of waves with steady currents; and the steepening of short gravity waves on the crests of longer waves. In previous papers these effects have been discussed rigorously by detailed perturbation analysis. In the present paper a simplified exposition is given of the radiation stresses and some of their consequencies. Physical reasoning, though less rigorous, is used wherever possible. The influence of capillarity on the radiation stresses is fully described for the first time. (Author)

AD-615 706 Div. 02/8, 02/1
CFSTI Prices: HC$1.00 MF$0.50

Colorado School of Mines, Golden.
PRODUCTION OF OXYGEN FROM SILICATES IN AN ULTRAHIGH VACUUM (FORMERLY LUNAR TOPOGRAPHY, PETROLOGY, AND MINERALOGY).
Rept. for 21 Jun 62-7 Apr 65,
by Fred L. Smith. 12 Apr 65, 24p
Grant AF AFOSR62 426, Proj. 320521
AFOSR 65-0739

Unclassified report

Descriptors: (*Oxygen, Production), (*Silicates, Oxygen), (*Moon, Oxygen), Vacuum apparatus, High-temperature research, Decomposition, Rock (Geology), Minerals, Silicon compounds, Dioxides, Monoxides, Magnesium compounds.

The object was to determine if an ultrahigh vacuum facilitated the decomposition of silicates into oxygen and silicon oxide (SiO) or silicon. The practical object was to initiate further research on the possibility of using this oxygen as a lunar resource. An ultrahigh vacuum chamber was constructed capable of obtaining pressures down into the 10 to the -12th power torr range, and simulating the lunar environment. In order to monitor the results of the experiments, a small mass spectrograph was installed on the ultrahigh vacuum test chamber. Tests were run on silicon dioxide, magnesium silicate, and a tektite (an amorphous silicate). All tests indicate that the ultrahigh vacuum significantly lowered the decomposition temperatures of the silicates. In all cases oxygen production was initiated at 1316C. At 1472C the production of oxygen was materially accelerated. The mass spectrograph studied indicates that silicon was produced rather than silicon oxide. In view of the very high pumping speed of the diffusion pump and cryopump on the chamber, it is believed that oxygen production is significant in the 1400 to 1650C range.

AD-615 724 Div. 02/5, 18/1, 18/5
CFSTI Prices: HC$2.00 MF$0.50

Boston Coll., Mass.
GEOLOGY OF THE NORTH AMERICAN AIR DEFENSE COMBAT OPERATIONS CENTER, CHEYENNE MOUNTAIN AND PERIPHERAL AREA, NEAR COLORADO SPRINGS, EL PASO COUNTY, COLORADO,
by Steven D. Theodosis and James W. Skehan.
8 Mar 65, 42p Scientific rept. SR-2
Contract AF19 628 1622, Proj. 4600, Task 460008
AFCRL 65-190

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Colorado, Structural geology), (*Geology, Colorado), (*Underground structures, Military

facilities), (*Military facilities, Air defense command), (*Air defense command, Combat information centers), Geological survey, Engineering geology, Well logging, Mountains, Granite, Stresses, Faults (Geology), Communication system.

The NORAD Project, Combat Operations Center, is in Cheyenne Mountain, consisting largely of highly fractured granite. The fracturing is genetically related to the Ute Pass fault, the major boundary along the eastern side of a large granitic block, uplifted vertically more than 20,000' and partially thrust over a 7000-8000' thickness of sediments. The investigation of the area was undertaken to: (1) establish the distribution of major geologic features which could have an important bearing on interpretation of deep crustal resistivity data, and (2) to locate a drill hole for use in deep strata communication testing. (Author)

AD-615 728 Div. 02/10, 02/5
CFSTI Prices: HC$1.00 MF$0.50

Instituto Geografico y Catastral, Madrid (Spain).
A STUDY OF SEISMICITY ON THE PENINSULA IBERICA AREA.
Annual summary rept. no. 2, 1 Jan-31 Dec 64,
by J. M. Munuera. 18 Jan 65, 10p
Contract AF61 052 657
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Seismology, Spain), Microseisms, Earthquakes, Seismographs, Structural geology.

AD-615 732 Div. 02/5, 13/4
CFSTI Prices: HC$3.00 MF$0.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
INTERNAL FRICTION OF H2O, D2O AND NATURAL GLACIER ICE,
by Daisuke Kuroiwa. Jan 65, 51p
Research rept. no. RR-131
Task IV014501B52A31
Unclassified report

Descriptors: (*Internal friction, Ice), (*Ice, Internal friction), (*Glaciers, Internal friction), Water, Heavy water, Impurtiies, Viscosity, Crystal lattices.

The three parts of this report are entitled (1) internal friction of pure H2O, D2O and doped ice crystals, (2) internal friction at crystal boundaries, and (3) the internal friction of natural glacier ice. Part 1 uses the flexural vibration method and expresses internal friction as a logarithmic decrement of free oscillation. Equations are given for the logarithmic decrement, internal friction, and the resonant frequency of a rectangular bar. In Part 2 the grain boundary internal friction of ice grown from a melt was measured by cutting blocks containing individual crystal boundaries from polycrystalline ice and inlaying these in single crystal bars. This friction depends upon concentrated chemical impurities. In Part 3 the internal friction of glacier ice was measured in specimens form Antarctica, Greenland, and Le Conte Glacier, Canada. Distinctively different curves were obtained for the specimens. These differences can be attributed to (1) environmental conditions at the time of formation, and (2) the environmental conditions that acted on the sample from the time of formation until the time of sampling. (Author)

AD-615 741 Div. 02/9
CFSTI Prices: HC$3.00 MF$0.75

Lamont Geological Observatory, Palisades, N. Y.
DYNAMICS OF GULF STREAM MEANDERS,
by Takashi Ichiye. Apr 65, 93p
Rept. nos. CU-266(48)-13, and CU-1806-3
Contract Nonr26648; Grant NSF GP1806
Unclassified report

Descriptors: (*Gulf stream, Hydrodynamics), Reviews, Dynamics, Ocean currents, Stability.

Hydrodynamical theories on meanders of the Gulf Stream and similar western boundary currents are critically reviewed. Observed facts of meanders east of Cape Hatteras are described including data obtained in Operation Cabot and Gulf Stream '60. Long waves along a shearing horizontal current in a rotating barotropic system are discussed. Stability of long waves in a uniform current of a two-layer ocean is treated. Theories on waves on a shearing current in the upper layer of a two-layer current including Duxbury, Iwata and Yasui are presented. General criteria on stability of a baroclinic flow are discussed. The Rossby waves in a barotropic and baroclinic ocean are explained. Instability of waves in an eastward flow is discussed as a cause of meanders. Applications of Rossby's constant absolute trajectory theory to meanders by Saint-Guily, Warren and Ichiye are presented and Greenspan's criterion on stability of a western boundary current is derived. The cross current momentum eddy transfer determined by Webster and Ichiye for the Gulf Stream and the Kuroshio, respectively, and the eddy heat transfer determined by Oort for the Gulf Stream are discussed. Possibility of testing some theories on meanders by use of a rotating tank is discussed.

AD-615 751 Div. 02/9
CFSTI Prices: HC$1.00 MF$0.50

Woods Hole Oceanographic Institution, Mass.
SYNOPTIC OCEANOGRAPHY AND ENVIRONMENTAL INVESTIGATIONS.
Periodic status rept. for 1 Jul 63-30 Jun 64,
comp. by J. H. Stanbrough. Sep 64, 14p
Ref-64-39
Contract Nonr335100, Proj. NR083 501
Unclassified report

Descriptors: (*Oceanographic data, Atlantic Ocean), (*Oceanology, Oceanographic equipment), Ocean currents, Buoys, Marine geophysics, Geodesics, Navigation, Telemeter systems, Instrumentation, Surface properties.

Basic and applied research in synoptic oceanography during the period is reported. Current measurements with moored and drifting buoys, surface phenomena, environmental studies, marine physical geodesy and VLF relative navigation are discussed. Publications resulting from the research is included. (Author)

09. Electronics and Electrical Engineering

AD-615 215 Div. 30/2
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON THE SYNTHESIS OF CONTROL SYSTEMS FOR AN ELECTRONIC DIGITAL COMPUTER,
by N. G. Bruevich. 23 Apr 65, 25p FTD-TT-64-785
TT 65-62215

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR, Izvestiya. Energetika i Transport n4 p93-106 1961.

Descriptors:(*Digital computers, Programming (Computers)), (*Programming computers, Digital computers), (*Control systems, Synthesis), Computer logic, Computer storage devices, Signals, Trigger circuits, Switching circuits, USSR.

AD-615 221 Div. 08/7, 15/1, 15/2
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
STOCHASTIC AGGREGATES AND QUESTIONS IN THE THEORY OF INFORMATION,
by V. V. Chavchanidze. 15 Apr 65, 14p
FTD-TT-64-1155
TT 65-62221

Unclassified report

Unedited rough draft trans. of Akademiya Nauk Gruzinskoi SSR, Tiflis. Institut Fiziki. Trudy v8 p277-85 1962.

Descriptors: (*Communication theory, Groups (Mathematics)), (*Groups (Mathematics), Stochastic processes), Mathematical logic, Numerical methods and procedures, Probability, Computers, USSR.

Finite messages are considered in this work. The formula of finite message entropy is deduced. It is more general than Shannon's formula; when the length of the message N approaches infinity, Shannon's formula is obtained. The theory of general and Boolean stochastic aggregates is considered. The formula deduced before is used and realizes the method of Markov-Chandrasekhar for discrete random magnitudes. The interpretation of the theory is given in the field of the algebra of logic. (Author)

AD-615 224 Div. 08/2, 20/3
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
BEHAVIOR OF DIFFUSION-BASE GERMANIUM TRANSISTORS IN A GAMMA-RAY FIELD,
by A. V. Yurovskii and M. P. Sinyukov. 16 Apr 65, 9p FTD-TT-64-1164
TT 65-62224

Unclassified report

Unedited rough draft trans. of mono. Elektronno-Dyrochnyye Perekhody v Poluprovodnikakh, Tashkent, 1962, p315-8.

Descriptors: (*Transistors, Germanium), (*Radiation damage, Transistors), (*Gamma rays, Radiation damage), Electric currents, Conductivity, Feedback, Electron transitions, USSR.

The effect is explained of gamma radiation on the parameters of high-frequency diffusion germanium transistors of the type P-403. The coefficient of amplification of the current, the output conductance, and the feedback current of the collector were measured on the instrument IPPT-1 in a circuit with a common base in one system of operation on direct current.

AD-615 225 Div. 25/6, 20/3
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SENSITIVITY OF SILICON PHOTOCELLS TO GAMMA-RAYS,
by A. Shalpykov and E. M. Lobanov. 16 Apr 65, 14p FTD-TT-64-1165
TT 65-62225

Unclassified report

Unedited rough draft trans. of mono. Tashkentskaya Konferentsiya po Mirnomu Ispolzovaniyu Atomnoi Energii, Tashkent, 1959. Trudy, v1, 1961, p271-6.

Descriptors: (*Photoelectric cells (Semiconductor), Photoelectric effect (Gamma rays)), (*Photoelectric effect (Gamma rays), Photoelectric cells (Semiconductor)), (*Silicon , Photoelectric cells (Semiconductor)), Gamma rays, X rays, Sensitivity, Electric currents, USSR.

Different photoelectric characteristics of silicon photocells were obtained for the purpose of comparing the action of the different kinds of penetrating radiation on silicon photocells.

AD-615 252 Div. 08/4
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
TORUS-TYPE MULTIPLYING SYSTEM OF A PHOTO-ELECTRIC MULTIPLIER,
by A. G. Berkovskii. 28 Apr 65, 5p
FTD-TT-64-1293
TT 65-62252

Unclassified report

Unedited rough draft trans. of Russian Patent 161 087, 27 Mar 63, appl. no. 827 478/26-9
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Photomultipliers, Design), (*Photo-electric effect, Photomultipliers), Patents, USSR.

The object of the invention is a torus-type multiplying system of a photoelectric multiplier which is distinguished by the fact that for the purpose of improving the rigidity, raising the quality of the centering of the emitters, and simplifying the techology of the assembling, the inner emitters are fastened on ring screens arranged between ring screens on which there are fastened the outer emitters, and the relative disposition of the screens is fixed by insulating rods. (Author)

AD-615 255 Div. 07/5
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
A METHOD FOR THE THERMAL ANALYSIS OF ELECTRICAL MACHINES HAVING DIRECT COOLING,

by N. P. Ivanov and I. F. Filippov. 21 Apr 65, 17p
FTD-TT-64-1296
TT 65-62255

Unclassified report

Unedited rough draft trans. of Elektrichestvo (USSR) n1 p17-21 1963.

Descriptors: (*Generators, Cooling), (*Coils, Cooling), Electric power production, Heat transfer, Specific heat, Thermal properties, Theory, Equations, USSR.

AD-615 259 Div. 08/1, 30/4
CFSTI Prices: HC$2.00 MF$0.50

Anti-Submarine Warfare Lab., Naval Air Development Center, Johnsville, Pa.
SONOBUOY ANTENNA RANGE AT THE U. S. NAVAL AIR DEVELOPMENT CENTER,
Phase rept.,
by W. F. Brenner and W. L. Leupold. 26 Apr 65, 45p NADC-AW-6429
Task RUDC2B000 2021F001 13 01

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Radio sono buoys, Antenna radiation patterns), (*Antenna radiation patterns, Radio sono buoys), (*Radio ranges, Radio sono buoys), (*Naval research laboratories, Radio ranges), Antennas, Electrical impedance, Radiofrequency power, Undersea warfare, Test equipment (Electronics), Test methods, Very high frequency.

A sonobuoy antenna range has been designed and constructed to permit factual evaluation of existing sonobuoy antennas, and to collect data needed for the development of improved sonobuoy antennas. An extensive evaluation of the antenna range has been completed, and results show that the range is capable of measuring antenna pattern, impedance, and radiated field intensity. (Author)

AD-615 270 Div. 08/2
CFSTI Prices: HC$1.00 MF$0.50

Harry Diamond Labs., Washington, D. C.
A RADIATION-TOLERANT VCO FOR HIGH-G APPLICATIONS,
by Joel S. Cohen. 23 Feb 65, 18p Rept. no. TR-1279
Projs. 55000, 1M01051A005

Unclassified report

Descriptors: (*Relaxation oscillators, Tunnel diodes), (*Tunnel diodes, Oscillators), Mathematical analysis, Voltage, Stability, Acceleration, Epoxy plastics, Embedding substances, Radiation damage, Reliability (Electronics), Circuits.

A mathematical analysis of a voltage-controlled tunnel-diode oscillator is described. The oscillator is designed to function after experiencing a 25,000-g environment as well as a neutron flux density of 10 to the 14th power neutrons/sq cm. The oscillator circuit is inherently stable over a wide temperature range but requires a regulated voltage. It can be designed to meet the Inter-Range Instrumentation Group telemetry standards.

AD-615 272 Div. 08/3
CFSTI Prices: HC$1.00 MF$0.50

Harry Diamond Labs., Washington, D. C.
ANALOG COMPUTER ANALYSIS OF NETWORKS CONTAINING DIODES,
by Arthur Hausner. 12 Feb 65, 17p
Rept. no. TM-65-10
Proj. 39800

Unclassified report

Descriptors: (*Electrical networks, Analysis), (*Diodes, Electrical networks), Simulation, Analog computers, Effectiveness.

Larrowe's direct simulation method of analog computer analysis of electrical networks is extended to include diodes. The technique is somewhat artificial: each diode is replaced by a small inductance, which passes current in one direction. The limit as the inductance approaches zero is simply a high-gain limited amplifier that introduces feedback to properly preserve all current and voltage equations at all times. The stability of the method is briefly discussed and an example is given to show its effectiveness. (Author)

AD-615 274 Div. 08/2
CFSTI Prices: HC$1.00 MF$0.50

Harry Diamond Labs., Washington, D. C.
INSTABILITIES IN TRANSISTORIZED DOPPLER AMPLIFIERS,
by Wolfgang Wiebach. 19 Feb 65, 16p
Rept. no. TM-65-7
Projs. 16100, 1P222901A207

Unclassified report

Descriptors: (*Transistor amplifiers, Dopper effect), Stability, Performance (Engineering), Resistors, Capacitors, Voltage, Magnetic fields, Oscillation, Radio fields, Reliability (Electronics).

Two types of instabilities in a transistorized Doppler amplifier are described. Depending on the particular design of the amplifier, one instability is caused by a ripple voltage of the power supply and the other is caused by the presence of a magnetic rf field of a particular frequency and field strength. The mechanism responsible for the oscillations in the second case is explained and demonstrated. (Author)

AD-615 291 Div. 30/2, 08/2
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
METHOD OF CHANGING OVER ANALOG VALUES TO A DIGITAL CODE,
by E. I. Shirits. 27 Apr 65, 6p FTD-TT-64-1279
TT 65-62264

Unclassified report

Unedited rough draft trans. of Russian Patent 154447, pub. 10 Feb 62, appl. 763366/26-24.

Descriptors: (*Analog-to-digital converters, Circuits), Analog computers, Digital computers, Voltage.

A method is given for converting analog values into a digital code. The method is distinguished by the fact that for the purpose of diminishing the time of the conversion the slope of the saw-tooth voltage is varied a whole number of times, which is also a multiple of two after it has been compared with the voltage to be converted.

AD-615 293 Div. 08/1
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.

METHODS OF AUTOMATIC MEASUREMENT OF POLARIZATION CHARACTERISTICS WITHIN THE LIMITS OF THE WHOLE DIAGRAM OF DIRECTIVITY OF THE ANTENNA,
by Yu. I. Logachev and V. A. Torgovanov.
28 Apr 65, 6p FTD-TT-64-1281
TT 65-62266
Unclassified report

Unedited rough draft trans. of Russian patent 155 190, pub. 23 Apr 62, appl. 775 190/26-9.

Descriptors: (*Antennas, Polarization), (*Polarization, Measurement), Automatic, Patents, USSR.

The object of the invention is a method of automatic measurement of the polarization characteristics within the limits of the whole diagram of the directivity of an antenna which is distinguished by the fact that for the purpose of considerably heightening the productivity of the work in the measurement of the polarization characteristics of antennas one simultaneously revolves the transmitting antenna around the horizontal axis and the tested one around the vertical one and while this is going on the speed of the transmitting antenna is considerably higher than the speed of the tested one. The value for the coefficient of ellipticity then is judged by the depth of the modulation of the signal received. (Author)

AD-615 295 Div. 08/2
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
DEVICE FOR MEASURING THE DURATION OF IMPULSES AND FREQUENCY OF OSCILLATIONS,
by Sh. Yu. Ismailov and A. M. Smolyarov.
23 Apr 65, 7p FTD-TT-64-1289
TT 65-62268
Unclassified report

Unedited rough draft trans. of Russian patent 159 577, pub. 6 Dec 62, appl. 806 038/26-10.

Descriptors: (*Pulse analyzers, Frequency meters), (*Frequency meters, Pulse analyzers), Pulse counters, Pulse generators, Trigger circuits, Relaxation oscillators, Differentiating circuits, USSR.

A device is described for measuring the length of impulses and the frequency of oscillations. It contains a differential circuit, a trigger, a unit of comparison, a cathode repeater, a circuit of discharge, a generator of impulses, a circuit of comparison, a reversing counter, and a step-type motor with a reducer. The device is distinguished by the fact that for the purpose of measuring and recording the length of micro-second single and periodic impulses between the output unit of comparison and the control switch (key) a storage integrating circuit and a slave multivibrator are included, extending the difference impulse by the time of the operation of the mismatching. (Author)

AD-615 303 Div. 30/2
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
SIMULATION PROGRAMMING AND ANALYSIS OF RESULTS,
by Allen S. Ginsberg. May 65, 9p Rept. no. P-3141
Unclassified report

For presentation at the Simulation Panel of the Department of Defense Logistics Conference to be held at Warrenton, Va., 26-28 May 65.

Descriptors: (*Programming (Computers), Simulation), (*Programming languages, Simulation), Stochastic processes, Series.

Techniques are discussed that have arisen for simplifying and speeding development of digital simulation and for increasing the meaningfulness of their results. SIMULATION PROGRAMMING: Of programming languages for a simulation model, the General Purpose Systems Simulator II (IBM DP Div., B20-6346, 1963) should be used if it is adaptable and if memory limitations and running time are not excessive; otherwise SIMSCRIPT (B. H. Markowitz and H. Karr, 'SIMSCRIPT: A Simulation Programming Language,' Englewood Cliffs, N. J., Prentice Hall, April 1963) or other languages should be used. The method of Ginsberg, Markowitz, and Oldfather (AD-613 976) for programming by questionnaire eliminates the need for learning a formal simulation language and reduces the time for obtaining a program to a matter of days or hours. ANALYSIS OF RESULTS: The complication of the variability of simulation results has been approached by Conway (AD-287 527) regarding the time series aspect and by Fishman and Kiviat (AD-612 281) regarding spectral analysis.

AD-615 311 Div. 08/3, 08/4, 25/2
CFSTI Prices: HC$6.00 MF$1.50

Minnesota Univ., Minneapolis. Physical Electronics Research Lab.
RESEARCH IN PHYSICS OF ELECTRON EMISSION AND ELECTRON TUBE TECHNOLOGY,
Interim rept. no. 5, 16 Oct 64-15 Apr 65,
ed. by D. E. Anderson, A. B. Laponsky, and W. T. Peria. 15Apr 65, 262p
Contract AF33 657 10475, Proj. 4156, Task 415605
Unclassified report

Descriptors: (*Photoelectric effect, Electron tubes), (*Electron tubes, Photoelectric effect), Thermionic emission, Secondary emission, Superconductivity, Films, Tunnel diodes, Surface properties, Cathodes, Aluminum compounds, Magnesium compounds, Barium compounds, Oxygen compounds, Nickelates, Electron multipliers, Crystal growth, Electron diffraction analysis.

Further secondary emission characteristics of Al203 and MgO dynodes are reported and a partial explanation of the behaviour of the resistance-strip electron multiplier is presented. Studies of thin-film tunnel current diodes and triodes and of hot electron injection into such devices are reported. Several experiments relating to BaO, (BaSr)O and nickelate cathodes are described. Further results of the surface studies of the Ge:Na and Si:Na systems are presented and progress in the understanding of the bombardment-induced desorption process is described. Successful growth of Na3Sb crystals is reported. A theoretical description of the diffraction of low-energy electrons by a crystal is discussed. (Author)

AD-615 312 Div. 08/2, 25/6
CFSTI Prices: HC$7.00 MF$1.75

Shockley Transistor Div., Clevite Transistor, Palo Alto, Calif.
FAILURE MECHANISMS IN SILICON SEMICONDUCTORS,
Final rept. for 1 Mar 63-31 Aug 64,
by W. Schroen and W. W. Hooper. Mar 65, 314p
Contract AF30 602 3016, Proj. 5519, Task 551902
RADC TR-64-524 Unclassified report
See also AD-608 456.

Descriptors: (*Semiconductors, Failure (Mechanics)), (*Transistors, Failure (Mechanics)), (*Reliability

(Electronics), Semiconductors), (*Silicon, Semiconductors), Stability, Thermal properties, Electrical conductance, Voltage, Surface properties, Oxides, Coatings, Protective treatments, Diffusion, Capacitors, Electric currents, Electric fields.

Investigations were made of thermal instability in silicon power transistors, and the related phenomena of hot spots and second breakdown. The theory of the thermal instability problem is presented. A rather extensive investigation of the damage which occurs in silicon power transistors as a result of hot spots and second breakdown is included, and finally, special transistor structures are studied which serve to confirm earlier theories on thermal instability and shed new light on possible methods by which the failure mode of second breakdown can be minimized. An investigation was made of the surface properties of oxide covered silicon and silicon p-n junctions. In particular, the problem of charge motion on the outer surface of the oxide covering silicon and silicon p-n junction was studied, with relevance to the current-voltage characteristics of reverse biased silicon p-n junctions. These investigations were directed at a better understanding of the physics of failures which occur in oxide covered p-n junction devices. (Author)

AD-615 323 Div. 07/3
CFSTI Prices: HC$1.00 MF$0.50

Burndy Corp., Norwalk, Conn.
PRODUCTION ENGINEERING OF TRIAXIAL PULSE CONNECTORS.
Quarterly rept. for 1 Jan-31 Mar 65,
by Rocco J. Noschese. 31 Mar 65, 14p
Contract DA36 039sc85964
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. A copy is available for public sale.

Descriptors: (*Electric connectors, Pulse cables), Design, Mechanical drawings, Manufacturing methods, Electrical corona, Electric insulation.

The work performed during this period involved the following: (1) Corona reducing design modifications were discussed, with a formal proposal drawing submitted persuant to the above-mentioned discussion. (2) The production of one engineering sample per the proposal was also begun during this period. This quarter ended with no actual production of operational units nor were any tests of any kind conducted. (Author)

AD-615 328 Div. 08/2
CFSTI Prices: HC$1.00 MF$0.50

General Telephone and Electronics Labs., Inc.,
Bayside, N. Y.
SEMICONDUCTOR MICROWAVE AMPLITUDE AND PHASE MODULATOR.
Quarterly rept. no. 7, 16 Nov 64-15 Feb 65,
by R. Harrison, J. Zucker, F. Drago, and D. Fleri.
15 Feb 65, 22p Rept. no. TR-65-103.7
Contract DA36 039AMC02284E, Task 1P6 22001A056
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Modulators, Semiconductor devices), (*Semiconductor devices, Modulators), Microwave equipment, Amplitude modulation, Phase modulation, Silicon, Epitaxial growth, Diodes (Semiconductor), Varactor diodes, Phase shifters, Tuning devices, Gallium alloys, Arsenic alloys, Films, Epoxy plastics, Stability, Ultrahigh frequency, Very high frequency, Performance (Engineering).

Experiments on the amplitude modulator were extended into the uhf range. Typical measurements on experimental epitaxial silicon diodes yielded modulation indices of approximately 50 percent at 220 Mc/s and approximately 15 percent at 400 Mc/s. This decrease in modulation depth with increasing modulation frequency appears to be due to the frequency sensitivity of the wafer in which the diode is mounted. A new test structure has been designed which will enable a more accurate and reliable measurement of the equivalent circuit parameters of the PIN diode at 70 Gc/s. This unit is presently being fabricated. An experimental method was established for tuning the varactor phase shifter for maximum phase shift. This condition of tuning does not correspond to minimum insertion loss. In the 70-Gc/s hybrid ring configuration 50 degrees of phase shift was obtained with a 3.4 dB insertion loss. A method for coating the surface of the point-contact GaAs varactors with a thin epoxy film was developed in an effort to improve varactor stability. Initial tests on fourteen diodes treated in this manner show promising results. (Author)

AD-615 329 Div. 08/2
CFSTI Prices: HC$2.00 MF$0.50

Motorola, Inc., Phoenix, Ariz. Semiconductor Products Div.
HIGH POWER VARACTOR FOR UHF TRANSMISSION.
Quarterly progress rept. no. 2, 1 Oct-31 Dec 64,
by G. A. Louis. 31 Dec 64, 30p
Contract DA28 043AMC00278E, Proj. 1P6 22001A056
ECOM 00278-2
Unclassified report

Descriptors: (*Varactor diodes, Ultrahigh frequency), Radiofrequency power, Diffusion, Epitaxial growth, Dies, Bonding, Resistance (Electrical), Disks, Semiconductors, Silicon, Single crystals, Antimony, Impurities, Manufacturing methods.

A detailed discussion of the steps used to fabricate the structures described in previous monthly reports is included. Both the deep diffused structure fabrication and the epitaxial diffused planar structure are described. A high frequency die testing method is discussed which allows immediate evaluation of device performance in the die stage. Completed units with efficiencies approaching 70% with output powers to 27 watts are reported. (Author)

AD-615 337 Div. 30/2, 08/3, 12/3

Institute for Cooperative Research, Univ. of Pennsylvania, Philadelphia.
STUDY OF PIECE PART FAULT ISOLATION BY COMPUTER LOGIC. VOLUME 5. DESIGN OF FAULT ISOLATION TEST PROGRAM FOR FADAC CIRCUITS.
Final rept. for 1 Jul 62-30 Jun 64,
by C. Beckman, J. Adler, S. D. Bedrosian,
R. S. Berkowitz, and T. C. Chen. 30 Jun 64, 266p
Contracts DA36 034ORD3347RD, DA36034ORD3347A
Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale. See also AD-603 135, AD-603 136, AD-605 224.

Descriptors: (*Networks, Analysis), (*Checkout equipment, Guided missiles), (*Reliability (Electronics), Computer logic), (*Circuits, Test methods), Diodes (Semiconductor), Transistors, Programming (Computers), Relaxation oscillators,

Printed circuits, Programming languages, Digital computers, Compilers.

The purpose of the subject contract was to develop fault isolation test procedures for FADAC circuit boards expressed in FATAL II compiler language. A number of these test procedures were completed. However, only one circuit was finished to the point where it was run through the compiler. The input and output of the compiler for this test procedure is contained in the appendix. One of the difficulties encountered in this project was the shortage of test points in certain FADAC circuit boards. This is pointed out in Table 1 which shows that the number of test points contained in these 31 circuit boards varies from a low of zero to a high of 49. Another difficulty has been the specification of component parameter values. The manufacturer's specifications although probably suitable for production acceptance testing for individual components are very often not appropriate for in-circuit fault isolation testing. Table 2 summarizes some of the work done over the past 5 years on fault isolation test procedures for 14 circuits of both the Vacuum Tube and Solid State types. The number of parameters in these circuits varied from 9 for the simplest circuit to 386 for the Logic Flip Flop circuit. (Author)

AD-615 341 Div. 25/6, 08/2
CFSTI Prices: HC$2.00 MF$0.50

General Telephone and Electronics Labs., Inc., Bayside, N. Y.
NONLINEAR SEMICONDUCTORS AT MILLIMETER FREQUENCIES.
Quarterly rept. no. 7, 1 Dec 64-28 Feb 65,
by R. I. Harrison, E. Conwell, F. Drago, D. Fleri, and C. R. Smith. 31 Mar 65, 29p Rept. no. TR-65-102.7
Contract DA36 039AMC02300E, Proj. 1P622001A056
ECOM 02300-7

Unclassified report

Descriptors: (*Semiconductor devices, Millimeter waves), Mixers (Electronic), Detectors, Modulators, Noise (Radio), Cryogenics, Conductivity, Indium alloys, Antimony alloys.

Measurements of the noise figure of an experimental 70-Gc/s receiver incorporating InSb hot-carrier mixers at 77 K were undertaken. The initial results indicate that the noise figure of this receiver is approximately 6 dB higher than that of the same receiver using a Schottky barrier mixer at room temperature. A 70-Gc/s hot-carrier detector was designed and constructed which exhibited square-law behavior for rf power levels up to 5 mW. A reliable experimental technique for measuring the characteristics of the hot-carrier modulator at uhf was established. Measurements on a typical unit yielded modulation indices of 80 percent at 220 Mc/s and 40 percent at 400 Mc/s. The insertion loss of the modulator was 4.5 dB. (Author)

AD-615 344 Div. 08/2, 26/4
CFSTI Prices: HC$3.00 MF$0.75

Cornell-Dubilier Electronics Div., Federal Pacific Electric Co., Norwood, Mass.
PRODUCTION ENGINEERING MEASURE FOR CAPACITORS, FEED-THROUGH, SOLID ELECTROLYTE TANTALUM PELLET.
Quarterly rept. no. 4, 1 Jan-31 Mar 65,
by W. G. Bailey. 31 Mar 65, 60p
Contract DA36 039AMC03630E

Unclassified report

See also AD-611 218.

Descriptors: (*Tantalum capacitors, Manufacturing methods), Aging (Materials), Life expectancy, Electrolytic capacitors, Environmental tests, Performance (Engineering), Electrical impedance.

Manufacturing and low impedance production aging was completed on the four lots of preproduction samples started in the last quarter. Production testing was completed with a yield of 73.5%. All units were submitted to quality control for preproduction qualification testing. Qualification testing was started in accordance with the preproduction inspection per Table VI of SCL-6423. The life test was started without circuit impedance. Life test failures in excess of the specification limits occurred. A TAR of proposed corrective action was submitted. Preproduction inspection testing was continued.

AD-615 354 Div. 08/2

Polytechnic Inst. of Brooklyn, N. Y. Dept. of Electrical Engineering.
ON THE USE OF ORTHOGONAL EXPONENTIALS IN A FEEDBACK APPLICATION.
Revised ed.,
by Jerry M. Mendel. 13 Mar 64, 5p
Grant AF AFOSR62 280, Proj. 9749, Task 974901
AFOSR 65-0638

Unclassified report

Pub. in I E E E Transactions on Automatic Control p310-2 Jul 1964 (Copies not available to DDC or Clearinghouse customers)
Revision of manuscript submitted 28 Feb 64.

Descriptors: (*Control systems, Feedback), Identification, Time, Numerical analysis, Theorems.

This paper presents a discussion of the use of orthogonal exponentials in a time domain identification of a plant f(t) located in the forward path of a feedback control system. The identification f sub a (+) is subject to the constraint that it is to be used in place of the actual plant in a stability analysis of the closed-loop system.

AD-615 365 Div. 07/3

Mitre Corp., Bedford, Mass.
A NOMOGRAPH FOR MATCHING MICROWAVE TRANSMISSION LINES WITH DIELECTRIC,
by Donald E. Cozzens. 1964, 3p
Contract AF19 628 2390
ESD TDR-64-107

Unclassified report

Pub. in Microwave Journal Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Dielectrics, Transmission lines), (*Transmission lines, Microwave frequency), Nomographs, Waveguides, Halocarbon plastics.

A simple and effective method for rapid matching in waveguide and other high frequency systems is presented. High temperature and low dielectric materials which are commercially available can be readily applied to many matching problems in the microwave region. (Author)

AD-615 369 Div. 08/4
CFSTI Prices: HC$1.00 MF$0.50

Microwave Electronics Corp., Palo Alto, Calif.
DEVELOPMENT OF PPM-FOCUSED LOW-NOISE

TRAVELING-WAVE TUBES FOR K sub u-, K-, AND K sub a-BAND.
Interim Development rept. no. 6, 1 Nov-31 Dec 64.
May 65, 22p
Contract NObsr89323, Proj. SR0080304, Task 9293
Unclassified report

Descriptors: (*Traveling-wave tubes, K band), Magnets, Focusing, Noise (Radio), Broadband, Design, Environmental tests.

Included in this report are the final data sheets prepared for the balance of eight PPM-focused K sub u-band low-noise TWT's to be delivered against this contract. The completely packaged K-band tube was put on vibration and shock tests in accordance with Class 2 requirement of the military specification MIL-E-5400 E (ASG). The tube has performed satisfactorily. The PPM stack and package design were finally resolved for the K-band tube. The package outline drawing is shown. The first PPM stack for the K sub a-band tube was designed. As the result of the PPM-focusing study, 70 percent beam transmission was obtained with K sub a-band Tube 19. The K sub a-band final vacuum envelope design was made to improve beam focusing. (Author)

AD-615 382 Div. 08/2, 25/6
CFSTI Prices: HC$1.00 MF$0.50

Bell Telephone Labs., Inc., Murray Hill, N. J.
MICROWAVE DIODE RESEARCH.
Quarterly progress rept. no. 10, 10 Sep-9 Dec 64, by P. J. Fillingham. 20 Mar 65, 19p Rept. no. 19
Contract DA36 039sc89205, Proj. 1P6 22001A056
Unclassified report

Continuation of Contract DA36 039sc85325.
See also AD-602 780.

Descriptors: (*Diodes (Semiconductor), Microwave equipment), Tunnel diodes, X band, Microwave amplifiers, Oscillators, Electrical impedance, Semiconductors, Metal coatings, Gallium alloys, Arsenic alloys, Circuits, Zinc alloys, Gold alloys, Embedding substances, Performance (Engineering).

The report describes a low-impedance GaAs tunnel diode wafer that is designed for operation as either an amplifier or oscillator at 10 Gc with enhanced dynamic range. Parasitic resistance and inductance are held to low values by eliminating the etching process, by embedding the wafer in a matrix, and by coating the semiconductor with metal. GaAs diode wafers with peak currents of 10 to 100 ma, speed indices of 10 to 16 ma/pf, and resistive cutoff frequencies of 23 to 30 Gc have been made for testing the performance of low-impedance 10-Gc circuit structures. (Author)

AD-615 387 Div. 08/4
CFSTI Prices: HC$3.00 MF$0.75

Raytheon Co., Burlington, Mass.
HARMONIC AND SPURIOUS SIGNAL SUPPRESSION IN MAGNETRONS.
Final engineering rept. for Aug 63-Sep 64, by Robert E. Edwards and Peter S. Bottorff.
Sep 64, 94p Rept. no. PT-882
Contract NObsr89518
Unclassified report

Rept. on Project QR1248.
See also AD-605 181.

Descriptors: (*Magnetrons, Power), (*Reliability (Electronics), Magnetrons), C band, Radio signals, Malfunctions, Noise (Radio), Radiofrequency interference, Broadband, Space charges, Radiofrequency filters, Resonance, Attenuation.

An investigation was conducted to determine the causes of spurious output signals from magnetrons. Several corrective measures applied to the RK6344A C-band magnetron resulted in reduction of second and third harmonic output, and of other spurious signals and background noise over a wide frequency range, of 20 to 45 db. Field evaluation of the revised tubes by the Navy confirmed that improved RFI performance had resulted from the design changes. The general characteristics of the spurious signal phenomena, the design techniques developed, and the recommendations for further studies in the field should be of use to magnetron designers in solving RFI problems. Many of the findings will be applicable to other microwave tubes. Utilization of the information already gained, and further pursuit of the field, will lead to fewer electronic interference problems in the field and to increased equipment reliability. (Author)

AD-615 409 Div. 08/2, 14/2, 14/6, 14/8, 17/7, 25/6
CFSTI Prices: HC$11.45 MF$3.50

Electronic Properties Information Center, Culver City, Calif.
INDEX TO THE COLLECTION. PART I. THE COORDINATE INDEX, ACENAPHTHENE TO INDIUM PALLADIUM.
1965, 841p
Contracts AF33 616 8438, AF33 615 1235
Unclassified report

See also AD-615 410, -615 411, and -615 414.

Descriptors: (*Electronics, Documentation), (*Electrical properties, Materials), (*Materials, Electronics), Physical properties, Indexes, Bibliographies, Semiconductors, Magnetic materials, Solid state physics, Thermoelectricity, Plastics, Electric insulation, Organic materials, Thermionic emission, Dielectrics, Ferroelectric materials, Metals.

The 'Index to the Collection' of the Electronic Properties Information Center (EPIC), of the Air Force Materials Lab., initiates a plan for making available the indexing work of the Center. The 2 volumes of the coordinate index contain alphabetically arranged descriptors of materials, followed by alphabetically arranged properties. The individual property is always associated with the material under which it is placed. The accession numbers of articles appropriate to the material and property descriptors follow, referring the user to the 2 volumes of Part II, the Bibliography, where the bibliographic entries are arranged in order of the accession number. The six kinds of materials descriptors are: (1) individual element names, (2) compound name, (3) system notation, (4) the element, compound, or system placed upon a substrate, (5) a strictly generic term, and (6) a categorical term. A list of 'properties cross references' is included that refers from a property not in the primary indexing vocabulary to one that is there.

AD-615 410 Div. 08/2, 14/2, 14/6, 14/8, 17/7, 25/6
CFSTI Prices: HC$10.90 MF$3.25

Electronic Properties Information Center, Culver City, Calif.
INDEX TO THE COLLECTION. PART I. THE COORDINATE INDEX, INDIUM PHOSPHIDE TO ZIRCONIUM TELLURIDE.
1965, 788p
Contracts AF33 616 8438, AF33 615 1235
Unclassified report

See also AD-615 409, -615 410, and -615 414.

Descriptors: (*Electronics, Documentation), (*Electrical properties, Materials), (*Materials, Electronics), Physical properties, Indexes, Bibliographies, Thermionic emission, Semiconductors, Solid state physics, Electric insulation, Plastics, Organic materials, Metals, Thermoelectricity, Ferroelectric materials.

AD-615 411 Div. 08/2, 14/2, 14/6, 14/8, 17/7, 25/6
CFSTI Prices: HC$7.00 MF$1.75

Electronic Properties Information Center, Culver City, Calif.
INDEX TO THE COLLECTION. PART II. BIBLIOGRAPHY, 101 TO 6357.
1965, 341p
Contracts AF33 616 8438, AF33 615 1235
Unclassified report

See also AD-615 409, -615 410, and -615 414.

Descriptors: (*Electronics, Documentation), (*Electrical properties, Materials), (*Materials, Electronics), Physical properties, Indexes, Bibliographies, Semiconductors, Intermetallic compounds, Solid State physics, Single crystals, Plastics, Electric insulation, Ceramic materials, Organic materials, Radiation damage, Alloys, Spectroscopy, Magnetic materials, Thermoelectricity, Films, Dielectrics, Ferroelectric materials, Metals, Thermionic emission.

AD-615 412 Div. 08/2, 14/2, 17/1, 26/1
CFSTI Prices: HC$2.00 MF$0.50

Beryllium Corp., Reading, Pa.
PRODUCTION ENGINEERING MEASURE FOR BERYLLIUM OXIDE AND PARTS PRODUCED FROM IMPORTED ORES.
Quarterly progress rept. no. 6, 1 Oct-31 Dec 64, by J. F. Blum and Harold F. Lebo. 31 Dec 64, 36p
Contract DA36 039AMC01481E
Unclassified report

See also AD-612 775.

Descriptors: (*Ceramic materials, Electronic equipment), (*Beryllium compounds, Oxides), (*Electronic equipment, Ceramic materials), (*Power metallurgy, Mechanical working), Powers, Ores (Metal sources), Sintering, Particle size, Sulfates, Crystals, Extrusion, Microminiaturization (Electronics), Binders, Manufacturing methods.

The study of power sinterability as a function of average particle size was continued this quarter. A complete summary shows that average particle size, at this point of development, cannot be used on a control basis to accurately predict sinterability in the range of 1.7-2.8 micron average. However, a general correlation does exist, and reasonable predictions can be made at the extremes. In general, the average particle size should be maintained close to 1.7 microns to obtain a highly active powder, but coarser powder can still be fabricated to acceptable density. Two of the four parts required for the contract were fabricated employing the process developed during this study. The parts were pressed and sintered to the required dimensions with no difficulty. Final firing shrinkage was accurately controlled by controlling green and final fired density. Beryllium sulfate crystals were prepared to initiate the final four pilot plant powder uniformity runs. The crystals met all applicable specifications. (Author)

AD-615 413 Div. 08/2

Westinghouse Defense and Space Center, Baltimore, Md. Surface Div.
STUDY OF FABRICATION OF MICROELECTRONIC ASSEMBLIES FOR FREQUENCY AND TIME CONTROL SYSTEMS. PHASE II. A FEASIBILITY MODEL OF A MICROMINIATURE VLF/LF FREQUENCY SYNTHESIZER.
Final development rept. for 1 Apr 64-5 Apr 65, by J. W. McLucas and K. M. Peterson. 5 Apr 65, 68p Rept. no. MDE-5082
Contract NObsr87593, Proj. SR0080303, Task 9624
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is not available for public sale.
See also AD-429 384.

Descriptors: (*Frequency converters, Microminiaturization (Electronics)), (*Microminiaturization (Electronics), Frequency converters), Very low frequency, Low frequency, Modules (Electronics), Gates (Circuits), Semiconducting films, Integrated circuits, Mixers (Electronics), Crystal filters, Tuned circuits, Life expectancy, Packaging.

A VLF/LF synthesizer was constructed and tested in order to demonstrate the feasibility of using microelectronic digital and analog circuitry in complex electronic systems. The use of thin film circuitry instead of discrete components provided a significant increase in reliability. An MTBF of 1800 hours has been conservatively calculated for the VLF/LF synthesizer. An outstanding feature of the VLF/LF synthesizer is that there are no circuit adjustments. Another notable feature is that the modules can be easily checked and replaced if necessary. It is interesting to compare the relative volumes of circuitry, filters, and packaging in the synthesizer. The relative volumes are: circuitry 8%, filters 35%, and packaging 57%.

AD-615 414 Div. 08/2, 14/2, 14/6, 14/8, 17/7, 25/6
CFSTI Prices: HC$7.10 MF$2.00

Electronic Properties Information Center, Culver City, Calif.
INDEX TO THE COLLECTION. PART II. BIBLIOGRAPHY, 6358 TO 13600.
1965, 410p
Contracts AF33 616 8438, AF33 615 1235
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.
See also AD-615 409, -615 410, and -615 411.

Descriptors: (*Electronics, Documentation), (*Electrical properties, Materials), (*Materials Electronics), Physical properties, Indexes, Bibliographies, Semiconductors, Intermetallic compounds, Solid state physics, Single crystals, Plastics, Electric insulation, Ceramic materials, Organic materials, Radiation damage, Alloys, Spectroscopy, Magnetic materials, Thermoelectricity, Films, Dielectrics, Ferroelectric materials, Metals, Thermionic emission.

AD-615 439 Div. 08/2, 30/2
CFSTI Prices: HC$1.00 MF$0.50

Arizona Univ., Tucson.
ASTRAC II PLUG-IN DIODE FUNCTION GENERATOR,
by Robert H. Whigham. 1964, 1p
Memo no. ACL-M-101
Grants AF AFOSR89 64, NASA NS6 03 002 024
AFOSR 65-0585
Unclassified report

Descriptors: (*Analog computers, Circuits), (*Circuits, Diodes), Amplifiers.

The ASTRAC II plug-in diode function generator circuit is given.

AD-615 447 Div. 08/1, 01/1
CFSTI Prices: HC$2.00 MF$0.50

Army Electronics Research and Development Activity, Fort Huachuca, Ariz.
SCALE MODEL TECHNIQUES FOR INVESTIGATION OF AIRCRAFT ANTENNA RADIATION PATTERNS. Progress rept.,
by Clay O. Stephenson and Luvern R. Bauhs.
Apr 65, 46p USAERDAA-ELCT-12-65
Proj. 1L0 13001A91A10, Task 1L0 13001A91A 10
ECOM 6001
Unclassified report

Descriptors: (*Aircraft antennas, Model tests), (*Antenna radiation patterns, Aircraft antennas), Electromagnetic fields, Electromagnetic wave reflections, Antenna configurations, Measurement.

The report presents the initial experimental and theoretical investigation pursued in determining laboratory procedures for pattern measurements of aircraft antennas using scale models in an R.F. anechoic chamber, and developing analytical techniques of pattern prediction for general antenna-aircraft geometry. The assembling and initial calibration of the automatic instrumentation system to be utilized during the investigations has been accomplished. The initial series of investigations consisted of pattern measurements of quarter-wave monopoles mounted on a model of the OV-1 (Mohawk) aircraft. A 1:10 geometric scale factor was used for these tests. The development of a computer program to supplement the radiation measurements is in progress. The initial program employs magnetic and electric field equations to indicate far field vector magnitudes for specified radiator configurations and current distributions on a flat circular ground plane. It is presently being expanded to accommodate airframe geometry and higher order current element distributions. (Author)

AD-615 448 Div. 08/2, 06/6
CFSTI Prices: HC$1.00 MF$0.50

Army Electronics Command, Fort Monmouth, N. J.
MODULATOR PULSE AND VARIABLE RANGE-GATE PULSE CIRCUIT FOR LIGHTWEIGHT RADAR APPLICATIONS,
by Michael A. Fanuele. Jan 65, 15p
Technical rept. ECOM-2568
Proj. 1P6 20901A188, Task 1P6 20901A188 03
Unclassified report

Descriptors: (*Radar, Delay circuits), (*Delay circuits, Tunnel diodes), (*Tunnel diodes, Switching circuits), (*Range gating, Delay circuits), Moving target indicators, Portable, Doppler radar, Transistors, Modulators, Pulse modulation.

A lightweight range delay circuit containing a specially designed modulator and variable range-gate generator was developed to meet the need for accurate ranging circuits in small, lightweight combat surveillance radar systems. The circuit requirements were selected for compatibility with an experimental radar. The use of tunnel diode switches was the chief factor responsible for obtaining a simple, accurate circuit with good stability. Operation of the circuit is described in this report. (Author)

AD-615 449 Div. 08/4
CFSTI Prices: HC$1.00 MF$0.50

Army Electronics Command, Fort Monmouth, N. J.
FACTORS INFLUENCING ULTRAHIGH VACUUM IN MICROWAVE ELECTRON DEVICES,
by Stanley DuBuske. Jan 65, 25p
Technical rept. no. ECOM-2571
Proj. 1P6 22001A055, Task 1P6 22001A055 01
Unclassified report

Descriptors: (*Microwave equipment, Vacuum), (*Vacuum, Microwave equipment), Gases, Electron tubes, Performance (Engineering), Reliability (Electronics), Adsorption, Permeability, Glass, Metals, Ceramic materials, Diffusion, Traveling-wave tubes, Backward-wave oscillators.

In microwave electronic device design, the residual gases problem is usually given secondary attention though its effects on device performance and reliability can be of primary importance. The initial effects of residual gases in complex microwave electronic devices can adversely affect the cathode emission, beam focusing, output power, noise level, and internal vacuum almost instantaneously. In addition, irreparable damage can be done to internal precision components which can result in the premature failure of the device. Recent advances in the state-of-the-art in partial pressure mass spectrometer systems make a residual gases analysis of the materials and methods of microwave device fabrication possible on a rapid and scientifically accurate basis. To attain and to maintain the ultra-high vacuum needed for optimum performance, long life, and high reliability demanded by modern technology of microwave electronic devices, a knowledge of the interactions of gases with solid surfaces is required. The problem of residual gases in microwave electronic devices is discussed with respect to adsorption and desorption and the composition, sources and types of residual gases. (Author)

AD-615 493 Div. 30/2
CFSTI Prices: HC$4.00 MF$1.00

Univac, Blue Bell, Pa.
MEDIUM-SPEED MASS RANDOM-ACCESS MEMORY. Final rept. for 1 May-1 Nov 64,
by C. Chong, G. Reid, and A. Turczyn. Mar 65, 133p
Contract AF30 602 3430, Proj. 5581, Task 558108
RADC TR-64-571
Unclassified report

Descriptors: (*Computer storage devices, Feasibility studies), Thin films (Storage devices), Wire, Plating, Magnetic materials, Electrical impedance.

A feasibility study of a medium-speed, nonmechanical, mass random-access memory has been completed. The memory is to have a capacity of up to 10 to the 8th power bits at a cost of less than 1 cent per bit. The memory element chosen for this application is the magnetic thin-film plated wire operated in the nondestructive readout mode. Theoretical and experimental investigations have been made of the word and bit lines. Construction techniques have also been investigated. A preliminary design of the memory based on these investigations has been completed. (Author)

AD-615 498 Div. 08/2
CFSTI Prices: HC$2.00 MF$0.50

Sylvania Electric Products, Inc., Woburn, Mass. Semiconductor Div.
RELIABILITY ANALYSIS OF X-BAND TUNNEL DIODES. Status rept. for 25 Jun-25 Dec 64.
Apr 65, 47p
Contract AF30 602 3487, Proj. 4519, Task 451901
RADC TR-65-31 Unclassified report

Descriptors: (*Tunnel diodes, Reliability (Electronics)), X-band, Manufacturing methods, Germanium alloys, Tin alloys, Arsenic, Gallium, Impurities, Processing, Encapsulation, Analysis.

This report discusses improvements in tunnel diode fabrication techniques which are under development in Sylvania's Microwave Department laboratories. The basic approaches under investigation are standard product improvement, annular tunnel diode development, and solid structure tunnel diode development. Some of the innovations from this investigation are an improved package, an improved reproducible alloy process which does not use spheres as alloy material, and a solid structure device which requires no etching after assembly. Junctions produced by these techniques have been cycled 5 times from -196 C to + 100 C with no change in parameters, indicating a resistance to thermal shock damage. (Author)

AD-615 505 Div. 08/2, 05/1
CFSTI Prices: HC$3.00 MF$0.75

Sylvania Electronic Systems, Waltham, Mass.
AN ELECTROLUMINESCENT CROSSED-GRID DISPLAY.
Final rept. for 4 Jun 63-4 Jun 64,
by Joseph Hallett. Mar 65, 84p
Contract AF30 602 3081, Proj. 5597, Task 559701
RADC TDR-64-362

Unclassified report

Descriptors: (*Electroluminescence, Display systems), (*Display systems, Electroluminescence), Model tests, Data storage systems, Switching circuits, Modules (Electronic).

The organization and performance of an electroluminescent crossed grid display system has been studied and an experimental model has been constructed demonstrating the basic concepts developed during the study. This work is based on using a display panel that does not have integral storage; thus a buffer memory is included to minimize the load on the computer data-source, and to periodically refresh the displayed information. It is indicated that an image-organized magnetic core memory is most suitable for this system. Both semiconductor and magnetic circuits were investigated for driving the display, and magnetic circuits were found to provide superior performance and advantages. An improved technique for display panel construction permits construction of a large display surface from a number of individual modules. The experimental model has an 8 by 8 inch display with 16 line per inchresolution. An entire image may be erased and replaced with an entirely new image in less than one frame (1/30 second). Brightness is about .8 footlamberts for an average contrast ratio of about 20:1 and is independent of the density of displayed information. The techniques used are compatible with future use of light amplifiers or improved EL materials to provide increased brightness. (Author)

AD-615 522 Div. 08/1
CFSTI Prices: HC$2.00 MF$0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
ARRAY BEAM-FORMING NETWORKS,
by L. J. Ricardi. 13 Apr 65, 32p
Technical note no. TN-1965-12
Contract AF19 628 500
ESD TDR-65-64

Unclassified report

Descriptors: (*Phased arrays, Networks), Antenna feeds, Antenna radiation patterns, Phase shift, Time-delay relays.

This technical note presents a brief description of the various types of beam-forming networks and their salient characteristics. Particular emphasis is placed upon the differences between time delay and phase shift and the problems arising from multiple reflections within the network. Some practical networks are described and the physical limitations of multiple beam-forming networks are discussed briefly. This material was originally assembled as a tutorial presentation on the subject matter. (Author)

AD-615 523 Div. 30/2, 02/1, 05/5, 06/6
CFSTI Prices: HC$2.00 MF$0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
HAYSTACK UNIVAC 490 REMOTE TELETYPE CONSOLE CONNECTION,
by P. D. Smith. 5 May 65, 31p
Technical note no. TN-1965-17
Contract AF19 628 500
ESD TDR-65-67

Unclassified report

Descriptors: (*Computers, Electric connectors), (*Teletype systems, Electric connectors), (*Radio astronomy, Data transmission systems), Coding, Programming (Computers).

This report describes the Remote Teletype Console connection to the Univac 490 computer at Haystack. This system allows the pointing system in the computer to be controlled by an operator at a remote console. Descriptions of the operation and construction are included. (Author)

AD-615 537 Div. 08/2, 25/6
CFSTI Prices: HC$7.00 MF$1.75

Western Electric Co., Laureldale, Pa.
PRODUCTION ENGINEERING MEASURE. MECHANIZATION FOR .4 WATT DIODES AND 2N560 2N1051 2N1072 2N1195 TRANSISTORS, PHASE 2.
Final engineering rept. for 1 Jan 63-31 Dec 64,
by M. N. Reppert. 31 Dec 64, 310p
Contract DA36 039sc81294

Unclassified report

See also AD-609 522.

Descriptors: (*Semiconductor devices, Production), (*Transistors, Production), (*Diodes (Semiconductor), Production), Industrial production, Machines, Manufacturing methods, Test equipment (Electronics), Test methods, Guided missile components, Welding, Electric wire, Bonding, Processing.

27 operations were mechanized in Phase 1, and 21 have been refined and updated. Most modifications were directed toward improving machine repeatability and reliability. Changes in machine concept produced extensive changes on the wafering, the painting and coating, and the assembling case to stud and welding operations. Less prominent changes to the Collector Lead to Platform Welding machine has also altered the machine concept. A Tip Welding and Lead Trimming machine has overcome a header production problem, and, at the same time, mechanized the glassing mold unload and lead trimming operation. A Data Producing Test Set for diodes automatically tests and records the test results on punched cards for computer processing. This machine is primarily used during final inspection for sample testing of the diodes. An important concomitant

of Phase 2 activity has been the identification of a major 'Purple Plague' factor. The results of this investigation have given positive evidence that thick aluminum contacts increase the vulnerability of bonded gold wire to 'Purple Plague'.

AD-615 541 Div. 08/2
CFSTI Prices: HC$4.00 MF$1.00

Lansdale Div., Philco Corp., Pa.
RESEARCH AND DEVELOPMENT TO OBTAIN SEMICONDUCTOR DIODES FOR ELECTRONIC TUNING.
Final rept. for 27 Jun 63-26 Dec 64.
26 Dec 64, 125p Rept. no. Philco-R-182
Contract NObsr89508, Proj. SR0080301, Task 9351
Unclassified report

Descriptors: (*Diodes (Semiconductor), Tuning devices), (*Tuning devices, Diodes (Semiconductors), Avalanche diodes, Processing, Electronic equipment, Electrical properties, Semiconductors, Manufacturing methods, Hydrochloric acid, Etched crystals, Silicon, Silicon compounds, Dioxides.

The fabrication of 200-volt planar silicon diodes with an area of 0.1 to 0.4 sq cm was shown to be feasible, and techniques developed for obtaining that objective are described. It was concluded that additional improvements in yields and in electrical characteristics of devices could be realized by implementation of additional processing changes.

AD-615 542 Div. 08/2, 26/1
CFSTI Prices: HC$2.00 MF$0.50

Hughes Aircraft Co., Newport Beach, Calif.
THIN FILM MICROCIRCUIT INTERCONNECTIONS.
Quarterly progress rept. no. 3, 1 Oct-31 Dec 64,
by Maurice Yang and Bob G. Bender. 31 Dec 64, 45p
Contract DA28 043AMC00052E, Proj. 1P6 22001A057 03
Unclassified report

Descriptors: (*Miniaturization (Electronics), Vapor plating), (*Vapor plating, Vacuum apparatus), (*Metal films, Vapor plating), Electric connectors, Circuits, Electriccurrents, Direct current, Alternating current, Measurement, Electrodes, Welds, Chromium, Gold, Voltage, Oxygen.

The object is to further the development of state-of-the-art vacuum deposition techniques as required to provide reliable vacuum deposited interfacial interconnections and electrical crossovers and to establish optimum evaluation and design criteria to verify the reliability of the interfacial interconnections and electrical crossovers being investigated. TASK I Efforts to date to isolate, separate or nullify the effects of conductors and welds from the properties of the interconnects have been of marginal effect. Separate designs for AC measurements at 100 MC and 1000 MC and for DC tests have been conceived. Each pattern has been designed to eliminate the effects of the contacts and related pad areas. Design philosophy is detailed and initial measurements on an over size trial pattern have been made. TASK II An hypothesis to the assymetrical breakdown voltages encountered with earlier Cr or CrAu electrodes has been evolved. Preliminary test results indicate that the breakdown voltage is markedly improved by the treatment suggested by the hypothesis. This treatment consists of the addition of oxygen to the process.

AD-615 543 Div. 08/2
CFSTI Prices: HC$1.00 MF$0.50

Cornell-Dubilier Electronics Div., Federal Pacific Electric Co., Norwood, Mass.
PRODUCTION ENGINEERING MEASURE FOR THE PRODUCTION OF SILICON MONOXIDE CAPACITORS MICROELEMENT.
Quarterly rept. no. 7, 1 Dec 64-28 Feb 65,
by J. J. O'Connor. 28 Feb 65, 16p
Contract DA36 039AMC01478E
Unclassified report

Descriptors: (*Capacitors, Manufacturing methods), (*Silicon compounds, Ceramic capacitors), Production, Microminiaturization (Electronics), Capacitance, Life expectancy, Tests, Electrical properties, Heat treatment, Resistance (Electrical), Monoxides.

AD-615 546 Div. 08/2, 15/1
CFSTI Prices: HC$2.00 MF$0.50

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
OPTIMAL CONTROL SENSITIVITY DESIGN,
by A. Kestenbaum. Jun 65, 33p
Research rept. no. PIBMRI-1266-65
Contract AF49 638 1402 Unclassified report

Descriptors: (*Optimization, Control systems), Design, Game theory, Calculus of variations, Performance (Engineering).

AD-615 548 Div. 06/6, 08/2, 30/3
CFSTI Prices: HC$6.00 MF$1.25

Radiation, Inc., Melbourne, Fla.
MOLECULARIZED PCM TELEMETRY TRANSMITTING SET.
Final rept. for Jun 62-Jun 64.
Aug 64, 225p
Contract AF33 657 9033, Proj. 4107, Task 410720
AL TDR-64-206 Unclassified report

Descriptors: (*Telemetry transmitters, Molecular electronics), (*Molecular electronics, Telemetry transmitters), Feasibility studies, Coding, Integrated circuits, Packaged circuits, Transducers, Reliability (Electronics), Amplifiers, Digital computers.

This program wasconcerned with significantly advancing the state-of-the-art of PCM telemetry through the application of molecular electronic techniques. A system design that was compatible with molecular technology was chosen as a basis for the program. The primary design goals for this system were: (1) a 200-kc bit rate, (2) bit-rate stability of ± 1%, (3) resolution of eight bits, and (4) capacity of 127 analog channels and 33 bilevel channels. The details of the system design, the devise design and fabrication, and the assembly and test of the resulting electrical feasibility model are thoroughly discussed. The resulting system performance is presented together with the tests used for evaluation. The information obtained forms a sound basis for further development that will provide a high performance, molecular PCM telemetry system. (Author)

AD-615 554 Div. 08/4
CFSTI Prices: HC$2.00 MF$0.50

Warnecke Electron Tubes, Inc., Des Plaines, Ill.
RESEARCH AND DEVELOPMENT PROGRAM FOR X-BAND CROSSED-FIELD AMPLIFIER.
Quarterly engineering rept. for 13 Dec 64-12 Mar 65.
12 Mar 65, 49p
Contract NObsr89504, Proj. SF0100201, Task 9294
Unclassified report

See also AD-612 077.

Descriptors: (*X-band, Amplifiers), (*Crossed field devices, Amplifiers), (*Amplifier, X-band), Radio-frequency, Electromagnetic fields, Attenuation, Beryllium compounds, Oxides, Ceramic materials, Delay lines, Waveguides, Electron tubes, Electron guns, Electron tube parts, Design, Electric fields, Magnetic fields, Brazing, Cooling, Water.

The problem of bending of the delay line substrate under the combined forces of the coolant and vacuum was greatly alleviated and perhaps solved by narrowing it 25%. The alternate solution tried, a supporting member behind it, was less satisfactory. The input and output coupling was studied with the thought of suppressing the fast TEM wave between sole and line. Quarter-wave chokes are being investigated. Output and input matching need further improvement. Window design appears satisfactory. Preliminary studies of the beryllia ceramic substrate appear encouraging, but further improvement of the surface is required. The gun was shielded further because of its sensitivity to RF energy. Tests of guns alone indicate that for good enough transmission, the magnetic field must be increased, leading to too low a value of beam velocity. The brazing of the substrate to the water jacket has shown improvement, and several sub-assemblies were brazed successfully, both sapphire and beryllia. An amplifier tube is in the final stages of construction. (Author)

AD-615 556 Div. 08/4, 08/7
CFSTI Prices: HC$2.00 MF$0.50

Litton Industries, San Carlos, Calif.
RESEARCH ON NOISE IN CROSSED-FIELD GUNS.
Quarterly rept. no. 7, 1 Jan-31 Mar 65,
by R. P. Wadhwa. 20 Apr 65, 27p
Contract NObsr89546
Unclassified report

Descriptors: (*Electron guns, Noise (Radio)), (*Crossed field devices, Electron guns), Amplifiers, Gain, Frequency.

Additional measurements on the dependence of noise figure upon the various operating parameters are described. Noise measurements in the complete frequency band and reduction of noise figure by stub tuning at the output terminal of the tube are discussed. Data from the reflected power seems to indicate that there is a slight shift in frequency between hot and cold test VSWR measurements. The correlation between noise figure and VSWR measurements is discussed. Some Kino gun features are investigated experimentally by operating the tube at different values of the magnetic field; other parameters are changed accordingly. This requires then a velocity jump at the gun exit so that the electrons drift at the synchronous velocity in the interaction region. (Author)

AD-615 564 Div. 30/3, 08/2
CFSTI Prices: HC$1.00 MF$0.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
AN EXPERIMENTAL 10,000 VOLT PULSE GENERATOR.
Progress rept. for Jul 64-Mar 65,
by Stanley J. Wooten. 19 Apr 65, 16p
Technical note no. N-702
Task Y F015 12 08 005
Unclassified report

Descriptors: (*Pulse generators, Test equipment (Electronics)), Design, Transients, Attenuation, Tests, Filters (Electromagnetic wave), Networks, Suppressors, Voltage regulators, Transmission lines, Wiring diagrams.

Transient voltages, varying from about 100 volts to over 10,000 volts occur on electrical power lines supplying sensitive Naval cryptographic and computer equipment. These transients are capable of destroying, interrupting, or introducing errors into, such equipment. To evaluate the attenuation characteristics of suppression devices and networks to combat these transients, it was necessary to develop a suitable transient generator. This report describes a 0- to 10,000-volt pulse generator developed at NCEL for this purpose, and the method of its employment in a test procedure. Testing by this method has been shown to be simple, reliable, and inexpensive; accurate in pulse amplitude and pulse width; and relatively free of circuit ringing. The pulse generator discharges approximately 4 microfarads of capacitance at 0 to 10,000 volts, with a resulting maximum energy of 200 joules. (Author)

AD-615 576 Div. 08/3, 25/3
CFSTI Prices: HC$2.00 MF$0.50

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
A TOPOLOGICAL FORMULATION OF THE N-PORT PROBLEM AND THE SYNTHESIS OF A CLASS OF SINGULAR IMPEDANCE MATRICES.
Research rept.,
by Charles L. Suffel. Jun 65, 42p PIBMRI-1269-65
Contract AF49 638 1402
Unclassified report

Descriptors: (*Topology, Electrical networks), (*Electrical networks, Synthesis), Electrical impedance, Matrix algebra, Admittance, Theory.

This paper is in two parts. First, a rigorous, topological treatment is applied to the resistive n-port problem. Formulas are derived for the open-circuit impedance and short-circuit admittance matrices. Properties of these formulas are used to establish sufficient conditions for the realization of the matrices as well as a relationship between the network geometry and the ranks of the matrices. Secondly, Nambier's results are generalized to the case of an n-port with connected port structure. (Author)

AD-615 584 Div. 08/2, 25/6
CFSTI Prices: HC$3.00 MF$0.75

Bell Telephone Labs., Inc., Murray Hill, N. J.
ENGINEERING SERVICES ON TRANSISTORS.
Quarterly progress rept. no. 7, 1 Oct-31 Dec 64,
by C. R. Crowell, R. E. Davis, M. P. Lepselter, R. E. Maher, and R. L. Pritchett. 31 Mar 65, 69p
Rept. no. 19
Contract DA36 039AMC02227E, Proj. 1P6 22001A056
Unclassified report

See also AD-611 591.

Descriptors: (*Transistors, Germanium), (*Integrated circuits, Transistors), Semiconductor devices, Microwave frequency, Performance (Engineering), Silicon, Oxides.

Planar germanium transistors were fabricated by a two-oxide process. Performance has improved considerably over that reported earlier for devices of similar geometry. Gain figures of 12 to 14 db at 4 Gc and 7 to 8 db at 6 Gc have been measured on both common-base and common-emitter devices. Maximum available power gains of 8 db at 2 Gc and 2.5 db at 4 Gc were obtained on common-emitter units. A technique is described for batch-fabrication of semiconductor devices whose leads are an integral part of the device itself. These beam

leads are cantilevered beyond the edges of the semiconductor wafer, allowing direct bonding or welding to a substrate without applying any pressure to the wafer itself. The semiconductor wafer need not be brazed to the substrate since the leads will withstand at least 135,000 g's acceleration and provide adequate mechanical support for the device. The use of these preformed leads imposes no electrical penalty on the unit. Chapter 4 illustrates the application of beam-lead devices to multichip integrated circuits. Two DCTL circuits are described; one with beam-lead transistors and beam-lead resistors appliqued to a ceramic substrate, and the other using beam-lead transistors on a ceramic substrate with tantalum thin-film resistors. A linear amplifier with thin film resistors is also shown.

AD-615 604 Div. 30/2
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
JOSS: CONVERSATIONS WITH THE JOHNNIAC OPEN-SHOP SYSTEM,
by J. C. Shaw. May 65, 6p Rept. no. P-3146
Unclassified report

Presented at the International Federation for Information Processing Congress, New York, N. Y., 24-29 May 65.
See also AD-603 972, AD-614 992.

Descriptors: (*Special purpose computers, Numerical methods and procedures), (*Numerical methods and procedures, Special purpose computers), (*Data processing systems, Special purpose computers), Numerical analysis, Programming (Computers), Programming languages.

The JOHNNIAC Open-Shop System (JOSS) is an experimental system designed to demonstrate benefits of on-line interaction with a computer, particularly a computer limited to small numerical computations such as the JOHNNIAC. Examples are given of conversation with the computing system whereby computing requirements are met that are not well satisfied by conventional services. The first example is of the production of a table with the conversation directing JOSS to modify the program to specify pythagorean triples. JOSS stores numerical values, forms, and steps that begin with numerical labels. The second example is of the assistance JOSS gives by extensive checking of the user's instructions. JOSS comments from a stock of 40 'canned' messages (mostly error messages), frequently allowing the user to repair an error on the spot and direct JOSS to continue.

AD-615 610 Div. 08/4
CFSTI Prices: HC$1.00 MF$0.50

Radio Corp. of America, Harrison, N. J.
A LOW-NOISE, MULTIPLE-FUNCTION, X-BAND TRAVELING-WAVE TUBE.
Interim development rept. no. 10, 1 Jan-31 Mar 65,
by G. Hodowanec and M. Milden. 31 Mar 65, 14p
Contract NObsr87535, Proj. SR008 03 04, Task 9293
Unclassified report

See also AD-609 572.

Descriptors: (*Traveling-wave tubes, X-band), (*Microwave amplifiers, X-band), Video amplifiers, Electron guns, Helixes, Limiters, Design, Magnetic fields, Wiring diagrams, Metals, Ceramic materials, Multiple operation.

The report describes design modifications made on the electron-gun, -helix envelope, helix assemblies, and the video section of the multifunction tube. ADC wiring diagram of the tube is included.

AD-615 627 Div. 08/2, 08/1, 08/3, 08/4, 08/5, 08/6
CFSTI Prices: HC$11.55 MF$3.50

IIT Research Inst., Chicago, Ill.
PROCEEDINGS OF THE TRI-SERVICE CONFERENCE ON ELECTROMAGNETIC COMPATIBILITY (10th).
Nov 64, 853p
Contract DA28 043AMC00226E, Proj. 1E6 20501D449 01
Unclassified report

Conference held at the Museum of Science and Industry, Chicago, Illinois, November 17, 18, and 19, 1964.

Descriptors: (*Electromagnetism, Compatibility), Symposia, Radiofrequency, Interference, Radar interference, Radio receivers, Radar receivers, Electromagnetic shielding, Electronic equipment, Naval aircraft, Checkout equipment, Weapon systems, Measurement, Tracking, Satellites (Artificial), Transport planes, Ultrahigh frequency, Electric cables, Electric connectors, Coaxial cables, Antennas, Filters (Electromagnetic wave), Transients, Band-pass filters, Specifications, Panoramic cameras, Standards.

The conference was sponsored by the United States Army, Navy, and Air Force and was held in cooperation with the Group on Electromagnetic Compatibility of the Institute of Electrical and Electronic Engineers. Thirty-eight technical papers were prepared within the broad fields of electromagnetic compatibility, instrumentation, prediction, measurement techniques, cable coupling and shielding, reduction techniques, antennas, transients, and specifications and specifications testing.

AD-615 639 Div. 08/7, 08/6, 09/1
CFSTI Prices: HC$3.00 MF$0.75

Bolt, Beranek and Newman, Inc., Cambridge, Mass.
THE ANALYSIS AND DISPLAY OF THE INFORMATION CONTAINED IN TIME-VARYING SIGNALS.
Final rept. for Jan-Dec 64,
by Vincent J. Sharkey, William E. Fletcher, and Mario C. Grignetti. 9 Apr 65, 98p Rept. no. 1239
Contract AF19 604 8382, Proj. 4691, Task 469103
AFCRL 65-300
Unclassified report

Descriptors: (*Communication theory, Display systems), (*Signals, Mathematical analysis), Real time, Analog-to-digital converters, Fourier analysis, Statistical functions, Perturbation theory, Dynamics, Upper atmosphere, Radiofrequency power, Programming (Computers), Chemicals, Atmospheric motion, Turbulence, Programming languages.

In this report, two methods of analyzing signals, using digital techniques, are described. The first involves the computation of the autocorrelation (autocovariance) function and the estimation of the power spectrum from the autocorrelation function by Fourier transformation. The second is concerned with the estimation of over-all received signal power within pre-established frequency limits. The first is applied to the analysis of the data collected during one experiment in the FIREFLY program, the second to the data collected during one mission in the ORLANDO series. (Author)

AD-615 651 Div. 08/7, 30/5
CFSTI Prices: HC$2.00 MF$0.50

Army Electronics Command, Fort Monmouth, N. J.
CYBERNETIC AND STATISTICAL CONCEPTS OF ENTROPY AND CORRELATION RELATING TO SYSTEMS ANALYSIS AND SYNTHESIS (PARTITIONS OF DISCRETE INFORMATION SPACES),
by Erwin Biser. Apr 65, 48p ECOM-2572
Proj. 1P6 20801A187, Task 1P6 20801A187 01
Unclassified report

Descriptors: (*Communication theory, Statistical processes), (*Cybernetics, Communication theory), Systems engineering, Combinatorial analysis, Probability, Correlation techniques.

This report deals with an information theoretical model devised to yield the information content of a system by partitioning the system (parameters) into mutually exclusive sets (subsystems). The information content conveyed by the subsystems is then correlated with the information conveyed by the system as a whole (the latter is tantamount to observing the system parameters simultaneously). The cybernetic and statistical concepts of entropy and correlation have a wide application to many systems problems that are amenable to probabilistic models. These concepts can be fruitfully applied to assess and evaluate the degree of organization and disorganization of systems. The following related topics are also considered in some detail: extension of Shannon's fundamental inequality; the bearing of entropy and correlation on the analysis and synthesis of systems; consistency of information spaces and their underlying probability spaces; development of information correlators to measure the degree of independence and mutual dependence of the parameters (subsystem) under investigation; the extent to which system parameters can be grouped into disjoint sets (subsystems); partitioning procedures which are often dictated by considerations of time, cost, and effort. (Author)

AD-615 652 Div. 30/2, 06/1, 15/2
CFSTI Prices: HC$5.00 MF$1.00

Naval Postgraduate School, Monterey, Calif.
THE DESIGN AND CONSTRUCTION OF A COMPUTER SIMULATION.
Master's thesis,
by Colin P. Hammon. 1964, 158p
Unclassified report

Descriptors: (*Computers, Simulation), (*Game theory, Simulation), (*Underwater tracking, Helicopters), Antisubmarine warfare, Submarines, Sonar, Detection, Mathematical models, Effectiveness, Statistical analysis, Design.

A procedural approach to the design and implementation of a computer simulation model is presented, with a simulation model description and computer code. The discussion and example are intended as reference material for the computer science and computer war gaming courses offered at the United States Naval Postgraduate School. The sample computer simulation was designed for the statistical analysis of the comparative effectiveness of different ASW helicopter search tactics in a variety of tactical and physical environments. This simulation has available a wide range of input parameters and is applicable to all ASW helicopters and any search plan employing ten helicopters or less. The accompanying FORTRAN computer code was written for the CDC 1604 computer, and is adaptable to the IBM 7090-94 by the inclusion of the appropriate control cards and random number generator. (Author)

AD-615 658 Div. 30/2, 32/3
CFSTI Prices: HC$2.00 MF$0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
AN EXPERIMENTAL ON-LINE DATA STORAGE AND RETRIEVAL SYSTEM,
by J. F. Nolan and A. W. Armenti. 3 Feb 65, 42p
Technical rept. no. TR-377
Contracts AF19 628 500, Nonr410201
ESD TDR-65-36
Unclassified report

Descriptors: (*Programming (Computers), Data storage systems), (*Data storage systems, Programming (Computers)), Information retrieval, Computer logic, Data transmission systems, Computers, Multiple operation.

This report describes an experimental program system designed to test and demonstrate on-line storage and retrieval of formatted data based on complete internal descriptions of the files. The use of internal descriptions allows each user (who need not be a trained programmer) to define, modify, and cross-associate data files to suit his particular needs. The experimental program system was implemented by remote use of the Compatible Time-Sharing System (CTSS) facilities of Project MAC at the Massachusetts Institute ofTechnology. (Author)

AD-615 660 Div. 30/2, 32/2
CFSTI Prices: HC$1.00 MF$0.50

System Development Corp., Santa Monica, Calif.
ALGORITHMIC LANGUAGES PROJECT.
Final rept. for 1 Jun 62-15 Aug 64,
by Seymour Ginsburg. 3 Feb 65, 12p
TM-738/012/00
Contract AF19 628 485, Proj. 5632, Task 563205
AFCRL 65-169
Unclassified report

See also AD-284 383.

Descriptors: (*Programming languages, Theory), Mathematical models, Mathematical logic, Data processing systems, Language, Sequences, Set theory, Mapping (Transformations).

Reports that the purpose of this algorithmic languages project was to accomplish the following: 1) conduct research designed to develop a theory for algorithmic (programming) languages, 2) develop suitable mathematical models of currently used mathematical languages such as ALGOL, COBOL, and JOVIAL, and, 3) use the mathematical models to answer questions of interest about these languages. Reviews and summarizes findings presented in previous volumes in this series. (Author)

AD-615 719 Div. 30/5, 30/2, 32/9
CFSTI Prices: HC$2.00 MF$0.50

System Development Corp., Santa Monica, Calif.
EXPERIMENTALLY REGULATED EVOLUTION IN COMPUTER-AIDED SOCIETIES.
Professional paper,
by H. Sackman. May 65, 42p
Paper no. SP-2068
Unclassified report

Descriptors: (*Computers, Social sciences), (*Social sciences, Computers), Automation, Data processing systems, Sociology, Design, Simulation, Digital computers, Tests, Costs, Systems engineering.

A concept of instrumental automation is offered for

a more universal extension of experimental method to help regulate the social evolution of computer-aided systems. The pressing need for an integrative philosophy of instrumental automation is developed from several vantage points. The widespread experimental lag in contemporary computerized systems is pointed out for applied experimental design, simulation, and the collection and analysis of digital data. The largely unrecognized, but pervasive presence of experimental testing at all system levels is highlighted by a taxonomic survey of testing. The advantages of regulated, long-range testing for accelerated evolution throughout successive generations of systems is sketched from manual to advanced computerized versions. It is asserted that growing problems in a computer-aided society should be settled less by authoritative fiat and more by the grass roots of society through self-corrective, in-field evolution from open experiments admitting provisional results subject to continual improvements. (Author)

AD-615 720 Div. 30/2, 32/3, 32/9
CFSTI Prices: HC$1.00 MF$0.50

System Development Corp., Santa Monica, Calif.
CRIME PATTERN RECOGNITION IN NATURAL LANGUAGE.
Professional paper,
by Herbert H. Isaacs. May 65, 11p Paper no. SP-2077
Unclassified report

Presented at the International Federation for Information Processing Congress, New York City, 27 May 1965.

Descriptors: (*Criminology, Information retrieval), (*Information retrieval, Criminology), Data processing systems, Language, Programming (Computers), Police.

Discusses the experimental development of a computer program to process crime information in natural English language. This project has had the joint participation of the Los Angeles Police Department and the System Development Corporation. The object of the experiment is to determine the feasibility of utilizing natural processing techniques to assist patrol officers and detectives in crime pattern recognition. By crime pattern recognition is meant a wide range of crime analysis applications that include modus operandi, vehicles or weapons used, physical descriptions, speech patterns, etc., that can be of benefit in crime pattern recognition. Reports that it has been demonstrated that the information loss associated with the use of precoding techniques is all but eliminated in natural language inquiry. The interaction of the user with the machine system is also greatly enhanced by the use of natural language. (Author)

AD-615 729 Div. 30/3, 08/2, 30/5

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
AUTOMATION, VOL. 8, NO. 6 1963 (SELECTED ARTICLES).
2 Apr 65, 91p FTD-TT-64-791
TT 65-62374
Unclassified report

Unedited rough draft trans. of Avtomatyka (USSR) v8 n6 p3-10, 17-63 1963.
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Descriptors: (*Automation, Control systems), Servomechanisms, Optimization, Networks, Flowmeters, Telemeter systems, Telemetering transmitters, Stabilization systems, Digital-to-analog converters, Pulse counters.

Contents: A method of optimization of the transient response of a servo-system with a third order oscillatory drive, Approximate equivalent frequency characteristics of the carrier compensating RLC networks, An electromagnetic flowmeter with an inhomogeneous magnetic field of the pickup, Transmitter of a frequency telemetering system for small voltage output signals, Certain problems in the analysis of optimal systems of automatic stabilization, Analysis of errors in an automatic molten metal metering system, A method of approximating the characteristic equation of an automated gas main, A pulse magnetron gas discharge counter, Digital-to-analogue alternating current operated converter.

AD-615 731 Div. 30/2, 26/2, 32/8
CFSTI Prices: HC$2.00 MF$0.50

System Development Corp., Santa Monica, Calif.
FUNDAMENTALS OF INFORMATION PROCESSING AND COMPUTERS FOR STATE AND LOCAL GOVERNMENT,
by Joel M. Kibbee. 17 May 65, 34p
Rept. no. SP-2073
Unclassified report

Descriptors: (*Data processing systems, Management engineering), (*Computers, Management engineering), Programming (Computers), Real time, Programming languages, Input-output devices.

The paper introduces to the public manager the fundamentals of information processing and computers. To understand computers, it is necessary to distinguish between 'hardware' and 'software.' Hardware is the physical piece of equipment. Software is everything else--programs and procedures--needed by people to make computers useful. A computer should not be thought of as something which exists independently of software. This paper deals first with the information system--a collection of men, machines, and software, with each assigned that task which each does best--and then discusses hardware and data communications. Software, more important than hardware, and equally costly, is treated with primarily emphasis on programmer and user languages. Time-sharing, software-sharing, and information-sharing are covered, as well as the concepts of a unified information system and a coordinated information system. The paper concludes with a suggestion that state and local government might, through joint development, decrease the cost of software for each of them. (Author)

AD-615 742 Div. 08/1
CFSTI Prices: HC$3.00 MF$0.75

Cruft Lab., Harvard Univ., Cambridge, Mass.
OPTIMIZATION OF THE YAGI ARRAY, I,
by I. Larry Morris. 15 Oct 64, 68p
Scientific rept. no. SR-6 (Series 3)
Contract AF19 628 2406; Grant NSF GP851,
Proj. 5635, Task 563502
AFCRL 65-121
Unclassified report

Descriptors: (*Yagi antennas, Optimization), (*Optimization, Yagi antennas), Antenna radiation patterns, Antenna configurations, Potential theory.

The generalized integral equations for the curtain array are presented so that element length, spacing and radius may vary. The quasi-zero-order theory as originally applied to circular arrays and later extended to include

curtain arrays is reviewed. The separation principle which is employed to simplify the integral equations is discussed in detail. A modified quasi-zero-order theory which incorporates approximations to the integrals that are independent of element length and spacing is introduced. Six simple configurations are presented which compare the solutions and the residuals of the vector potential resulting from the original and modified quasi-zero-order theories. A number of single antennas and parasitic couplets for which there is experimental data, is compared with the modified theory. Currents, residuals, and radiation patterns are presented for 4- and 10-element Yagi arrays. (Author)

AD-615 743 Div. 08/2, 25/6
CFSTI Prices: HC$2.00 MF$0.50

Advanced Technology Corp., Timonium, Md.
DIODE, MILLIMETER WAVE TYPE MIXER (3.2 MM).
Quarterly rept. no. 6, 1 Sep-30 Nov 64,
by R. J. Bauer and J. W. Dozier. 31 Dec 64, 31p
Contract DA36 039AMC02347E, Proj. 1P6 22001A056
Unclassified report

Descriptors: (*Mixers (Electronics), Diodes (Semiconductors)), (*Diodes (Semiconductors), Mixers (Electronics)), Tunnel diodes, Millimeter waves, Life expectancy, Tests, Temperature, Performance (Engineering), Electrical impedance, Frequency, Gallium alloys, Arsenic alloys, Intermetallic compounds.

Temperature test results are presented on several sealed point contact diodes. Measurements have also continued on monitoring electrical performance versus diode age. Preliminary tests were conducted to insure that diode burnout would not be a problem. Millimeter wave VSWR measurements are compared between fixed tuned and variable tuned integrated waveguide-diode mounts. The last major problem of the program, that of providing a good IF VSWR, has been resolved. Tunnel diode mixers have been reinvestigated. A family of curves on conversion loss versus forward bias and local oscillator power is presented for one of the tunnel diode mixers. (Author)

AD-615 747 Div. 08/2
CFSTI Prices: HC$6.00 MF$1.25

Microwave Associates, Inc., Burlington, Mass.
SOLID-STATE MICROWAVE TR-ATR SWITCH PRODUCTION ENGINEERING MEASURES PROGRAM.
Final engineering rept. for 18 Apr 62-30 Sep 64,
by Paul Basken. 30 Sep 64, 232p
Contract DA36 039SC86718
Unclassified report

Descriptors: (*Radar duplexers, Diodes (Semiconductors)), (*Electronic switches, Diodes (Semiconductors)), (*Diodes (Semiconductors), Electronic switches), Manufacturing methods, Production, Performance (Engineering), Design, Test methods, Life expectancy, X band, Microwave equipment, Waveguide switches, Limiters, Mechanical drawings, Quality control.

In the report, the entire Production Engineering Measures Program is analyzed in three major sections covering the technical discussion of the contract work, a complete process specification, and an analysis of the quality control measures carried out. In the technical discussion, an effort is made to describe the design work in some detail. In addition, test results are summarized and an analysis is presented of the manufacturing problems. The process specification is intended to provide step-by-step instructions for the manufacture of switches by a competent manufacturer. The quality control section, in addition to listing all inspection positions, includes the final summarized results, technical analysis, and conclusions drawn of the production run tubes. (Author)

AD-615 748 Div. 08/4, 24/1
CFSTI Prices: HC$2.00 MF$0.50

Westinghouse Research Labs., Pittsburgh, Pa.
RESEARCH AND DEVELOPMENT OF A CAMERA TUBE FOR NIGHT VIEWING.
Final rept. for 1 Jul 63-31 Oct 64,
by G. A. Klotzbaugh. 3 Dec 64, 44p
Rept. no. 19, WRL-64-912-255-R7
Contract DA36 039AMC03205E, Task 1G6 22001A005 03
Unclassified report

See also PB-160 592.

Descriptors: (*Camera tubes, Design), (*Vidicons, Design), Night photography, Electron beams, Electronic scanners, Image intensifiers (Electronics), Image orthicons, Photocathodes, Iconoscopes, Photoelectric effect.

The report describes the complete results on a camera tube designed for low light level applications. This tube has been called the Image-Intensifier Vidicon; in reality it is an SEC (secondary-electron-conduction) vidicon with two TSE (transmission-secondary-emission) dynodes for pre-beam multiplication. The SEC target replaced the EBIC (electron-bombardment-induced-conductivity) target that had been used in the previous contract. Ten tubes were completed under the present contract, of which 7 were successfully tested. Measured pre-beam gains for these tubes have been in excess of 4000. As a camera tube, these tubes demonstrated the advantages of the SEC vidicon: non-blooming vidicon-type scan; high target storage capacitance; good picture quality at low light levels; and rapid signal readout in one frame. (Author)

AD-615 750 Div. 06/6, 12/2
CFSTI Prices: HC$2.00 MF$0.50

Naval Ordnance Test Station, China Lake, Calif.
PDM TELEMETRY SETS FOR SIDEWINDER,
by Thomas Wong, R. L. Thomason, and Gary Davis.
Feb 65, 48p NOTS-TP-3658
Task RM3001 003 216 1F009 15 001
NAVWEPS 8627
Unclassified report

Descriptors: (*Telemeter systems, Guidedmissiles (Air-to-air)), (*Guided missiles (Air-to-air), Telemeter systems), Telemetering antennas, Telemetering transmitters, Power supplies, Commutators, Telemetering data.

The description of the development of the telemetry systems used in the testing of the Sidewinder missile from 1952 to 1960 is reported. The six basic telemetering systems developed during this time, including the Type 6 unit used with Sidewinder 1C, are described. Details of the Type 5 telemetering unit used with Sidewinder 1A are provided. The data reduction methods used with these units are described. (Author)

AD-615 752 Div. 08/2, 26/1
CFSTI Prices: HC$3.00 MF$0.75

Texas Instruments, Inc., Dallas.
ADVANCED FABRICATION PROCESSES FOR FUNCTIONAL ELECTRONIC BLOCKS.
Interim engineering rept. no. 4, 2 Sep-2 Dec 64,

by W. T. Matzen. 19 May 65, 75p
Rept. no. TI-03-65-39
Contract AF33 615 1242

Unclassified report

Descriptors: (*Transistors, Manufacturing methods), (*Amplifiers, Design), Silicon, Band-pass amplifiers, Performance (Engineering), Models (Simulations), Audio amplifiers, Oscillators, Integrated circuits.

A study of the exponential voltage-current behavior of a certain reverse biased NPN transistor was initiated. Investigations of the silicon adaptive element were continued. Emphasis shifted from an optical to a thermal adaptive element. Design of the thermally stabilized dc amplifier is progressing. Device evaluation and design refinements are included. Development of an RC active filter for use as a bandpass amplifier is continuing. Performance tests of breadboard models were made and data is presented. Preliminary design work was completed for a 40 cps thermal oscillator. A high input impedance audio amplifier was designed. Performance tests of a breadboard model were made and photomasks for the integrated circuits are in process. (Author)

AD-615 754 Div. 08/1, 08/6, 25/3
CFSTI Prices: HC$5.00 MF$1.00

Raytheon Co., Waltham, Mass. Research Div.
HIGH POWER MICROWAVE FERRITES AND DEVICES.
Final rept. for 1 Jan 63-31 Dec 64,
by E. Schlomann, J. J. Green, J. H. Saunders, E. A. Maguire, and A. E. Paladino. 31 Dec 64, 154p
Rept. nos. R-8, S-742
Contract DA36 039AMC00064E,
Proj. 1C024401A112 3A99 15 006,
Task 1C024401A112 02

Unclassified report

Continuation of Contract DA36 039SC85372.

Descriptors: (*Ferrites, Waveguide circulators), (*Waveguide circulators, Microwave equipment), (*Microwave equipment, Ferrites), S band, Phase shift, Excitation, Delay lines, Garnet, Magnetic fields, Photons, Phonons, Ferromagnetic materials.

The theory of spin-wave generation in nonuniform magnetic fields is reviewed. Detailed theoretical results concerning the photon-magnon conversion, the magnon-phonon conversion, the frequency- and field-dependence of the delay time, and the insertion loss are presented. A general theory of the nonuniform demagnetizing field of nonellipsoidal samples is described. Experimental results concerning the field dependence of the delay time are presented both for the case in which the spin waves generated are exchange dominated and the case in which they are dominated by the magnetostatic interaction. The power handling capability of circulators and phase shifters in rectangular waveguide is analyzed. The development of a high power S-band material is described. Approximately 130 different garnet compositions containing Y, Gd, Fe, Al, In and a strongly relaxing rare earth ion (such as Dy, Ho or Tb) have been investigated. The development of an S-band high-power ferrite circulator is described.

AD-615 760 Div. 08/2, 26/1
CFSTI Prices: HC$2.00 MF$0.50

Clevite Corp., Bedford, Ohio.
PRODUCTION ENGINEERING MEASURE FOR CERAMIC FILTERS.
Quarterly rept. no. 8, 30 Dec 64-29 Mar 65,
by A. Lungo. 29 Mar 65, 29p
Contract DA36 039AMC01471E

Unclassified report

Descriptors: (*Ceramic materials, Filters (Electromagnetic wave)), (*Filters (Electromagnetic wave), Ceramic materials), Resonators, Tuning devices, Piezoelectric crystals, Packaging, Manufacturing methods, Shock (Mechanics), Tests Printed circuits, Resonators, Machining, Disks, Springs, Mechanical drawings.

An investigation of an improved resonator contact and resonator support concept was completed. The new concept replaces the circular contact springs with helical compression springs. The results of the investigation are presented and discussed. New package designs were initiated incorporating the helical compression springs. The progress of the new package designs is discussed. Several problems which are anticipated to occur during the manufacture of the preproduction filters and the production run of filters are presented and discussed. The status of the production fixture designs is presented. (Author)

10. Energy Conversion (Non-propulsive)

AD-615 310 Div. 07/1
CFSTI Prices: HC$1.00 MF$0.50

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
DESIGN OF HYDROGEN-OXYGEN CAPILLARY TYPE FUEL CELL.
Quarterly technical progress rept. no. 6, 1 Feb-30 Apr 65, 15 May 65, 17p
Contract AF33 615 1185, Proj. 8173, Task 817303
Unclassified report

Descriptors: (*Fuel cells, Design), (*Oxygen, Fuel cells), (*Hydrogen, Fuel cells), Electric power production, Satellites (Artificial), Performance (Engineering), Tests.

Specifications were completed for the major system components, equipment environmental requirements and the system qualification test. Quotations for the major components were received, evaluated and the components ordered. A new shutter design as well as the design and fabrication of a new shutter forming tool were accomplished. Cell plate fabricating methods were evaluated. Die casting, chemical milling and forging were investigated. The plate design for the 1965 prototype module has almost been completed. Several of the four 1964 laboratory prototype modules were subjected to operational tests. Other design studies and materials tests were also conducted during this period.

AD-615 330 Div. 07/6, 07/3, 08/2
CFSTI Prices: HC$2.00 MF$0.50

Honeywell, Inc., Hopkins, Minn.
LOW INPUT VOLTAGE CONVERSION.
Quarterly progress rept. no. 3, 1 Sep-30 Nov 64, by Kenneth J. Jenson and John T. Lingle. 30 Nov 64, 42p
Contract DA28 043AMC00030E, Proj. 1C6 22001A053, Task 1C6 22001A053 05
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.
See also AD-611 269.

Descriptors: (*Voltage regulators, Design), Energy conversion, Thermoelectricity, Generators, Thermionic converters, Batteries and components, Power supplies, Fuel cells, Transistors, Circuits, Switching circuits, Oscillators, Feedback, Inverters, Magnetic properties, Electrical properties.

During this quarter, effort has been directed towards the design and fabrication of a low input voltageconverter-regulator for test with a thermionic diode source. Also fuel cell-low input voltage converter-regulator load system tests have been conducted with excellent results. The 200 watt low input voltage converter-regulator fabricated during the previous quarter was operated from two series connected fuel cells and from a four fuel cell series-parallel stack. With the fuel cells as a source, the converter provided a 135 watt regulated 28 volt output with an efficiency of 85%. This system satisfactorily powered a 28 volt dc motor during starting, stalling, motor reversal, and normal running tests. The system also performed satisfactorily when subjected to slowly increasing overloads and sudden dead shorts. These tests have verified that the low input voltage converter-regulator circuit works well with a fuel cell source and that no unstable operating modes occur. Thus, fuel cell-low input voltage converter-regulator systems can provide a practical and reliable means of achieving useful higher voltage regulated power for operation of electronic equipment in remote areas. The fabrication of the coaxial model for use with a thermionic diode source has been completed and is currently being checked out in the laboratory. It is anticipated that tests with a thermionic diode source will be arranged shortly. (Author)

AD-615 342 Div. 07/1
CFSTI Prices: HC$2.00 MF$0.50

Eagle-Picher Co., Joplin, Mo.
INVESTIGATIONS LEADING TO THE DESIGN AND DEVELOPMENT OF MAGNESIUM/MAGNESIUM PERCHLORATE BATTERIES.
Quarterly progress rept. no. 2, 1 Oct-31 Dec 64, by James Sharpe. 31 Jan 65, 42p
Contract DA28 043AMC00221E, Proj. 1C6 22001A053, Task 1C6 22001A05302
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Storage batteries, Magnesium), (*Magnesium, Storage batteries), Magnesium compounds, Perchlorates, Electrolytes, Electrolytic cells, Anodes (Electrolytic cell), Cathodes (Electrolytic cell), Battery separators, Lithium compounds, Chromates, Corrosion, Tests, Batteries and components.

Efficiency was improved by the addition of lithium chromate to the magnesium perchlorate. Studies indicated that the addition of one gram of lithium chromate per 100 ml of electrolyte will increase the anode efficiency in the range of five to fifteen percent. Conductivity studies were carried out and studies indicated that four normal magnesium perchlorate is the most applicable to use. Data has also indicated the higher the normality of electrolyte, the lower the resistance. Effort has been directed during the quarter to perfect a magnesium/magnesium perchlorate battery which would meet the requirements of the AN/PRC-62 specification, when discharged over a temperature range of -40F to +125F. The program was directed toward attaining the optimum performance at -40F with the minimum number of cells per battery. After this was completed, two units were constructed and discharged at +78F and +125F. Research in relation to positive and negative material was continued to reduce the cost of the battery and to keep its efficiency and reliability.

AD-615 753 Div. 07/2, 14/8, 26/1
CFSTI Prices: HC$4.00 MF$1.00

Linde Div., Union Carbide Corp., Parma, Ohio.
DEVELOPMENT OF THIN ORGANIC ROLLED FILM CAPACITOR.
Summary rept. for 26 Jun 63-26 Dec 64, by C. W. Umbaugh. 26 Dec 64, 124p
Contract NObsr89519, Proj. SR0080302ST9636
Unclassified report

Descriptors: (*Capacitors, Miniature electrical equipment), (*Dielectric films, Capacitors), Feasibility studies, Test methods, Plastic coatings, Electrolytic polishing, Cleaning, Thickness, Voltage, Winding, Encapsulation, Flame spraying.

The development program detailed and conducted with the object of creating a highly stable parylene film-extended foil capacitor is reported. Those procedures required to produce high quality parylene coated aluminum foil, as well as the capacitor fabrication and testing procedures, are described in detail. The feasibility of a metallized parylene capacitor is demonstrated. Various areas are recommended for additional development leading to improved capacitors of these types. (Author)

AD-615 756 Div. 08/4, 08/6, 25/3, 25/4
CFSTI Prices: HC$3.00 MF$0.75

Cornell Univ., Ithaca, N. Y. School of Electrical Engineering.
INVESTIGATION OF LINEAR BEAM AND NEW CONCEPTS OF MICROWAVE POWER GENERATION.
Quarterly progress rept. no. 5, 1 Oct-31 Dec 64, by G. C. Dalman and L. MacKenzie. Apr 65, 56p
Contract AF30 602 3243, Proj. 5573, Task 557303
RADC TR-65-22

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Electron beams, Microwave frequency), (*Radiofrequency power, Microwave frequency), (*Plasma physics, Electron beams), (*Klystrons, Electron beams), Lasers, Microwave equipment, Microwave amplifiers, Argon, Generators, Electron tubes, Phase shift, Transmission lines, Circuits.

Results are presented of basic studies of the interaction of magnetically focused electron beams with electromagnetic circuits, of basic electromagnetic interaction circuits, of electron beam phenomena, of an electron-beam plasma amplifier, and of laser-stimulated electron emission. The feasibility of using biased electron beams to control phase shift in linear beam tubes is demonstrated. A study of transmission-line equivalent circuits for periodic microwave circuits is reported. Experiments were conducted on immersed-flow electron beams, and studies made of the effects of axially varying magnetic fields on beam properties. Basic probe measurements of electron densities and effective electron temperatures were made on an argon plasma identical to that used for the amplifier. The problem of coupling of microwave signals to beam plasma amplifiers is discussed. Two applications of the laser-induced electron beam are considered: (1) the measurement of the beam-loading admittance, and (2) a new program involving active interaction in which a r-f signal is propagated by the beam.

11. Materials

AD-615 218 Div. 14/2, 26/1
CFSTI Prices: HC$2.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
JOURNAL OF THE ALL-UNION CHEMICAL SOCIETY, 1963, VOL. 8, NO. 2 (SELECTED ARTICLES), by D. N. Poluboyarinov, G. Kukolev, and I. I. Nemets. 15 Apr 65, 41p FTD-TT-64-1141
TT 65-2218

Unclassified report

Unedited rough draft trans. of Vsesoyuznoe Khimicheskoe Obshchestvo. Zhurnal (USSR) v8 n2 p148-54, 155-62 1963. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Ceramic materials, Stability), (*Refractory materials, Stability), (*Extrusion, Ceramic materials), Hot working, Beryllium compounds, Magnesium compounds, Calcium compounds, Aluminum compounds, Oxides, Thermal properties, Thermal stresses, Fracture (Mechanics), USSR.

Contents: Hot Extrusion of Pure Oxide Ceramics, by D. N. Poluboyarinov and Ye. I. Shal'nov, Modern Ideas About Thermal Stability of Refractory-Ceramic Materials and Ways of Increasing Same, by G. V. Kukolev and I. I. Nemets.

AD-615 220 Div. 17/2
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
STUDYING THE OXIDATION KINETICS AND STRUCTURE OF OXIDES OF CERTAIN HIGH-MELTING METALS,
by P. M. Arzhanyi, R. M. Volkova, and D. A. Prokoshkin. 15 Apr 65, 14p FTD-TT-64-1154
TT 65-62220

Unclassified report

Unedited rough draft trans. of Issledovaniya po Zharoprochnym Splavam (USSR) v9 p172-7 1962.

Descriptors: (*Niobium, Oxidation), (*Tungsten, Oxidation), (*Oxidation, Reaction kinetics), (*Oxides, Phase studies), Metallography, X-ray diffraction analysis, Heat of activation, Diffusion, Silicon, Titanium, Films, Crystal lattices.

An investigation was made of the kinetics of oxidation of niobium and tungsten in basic state and after saturating same with silicon and titanium. The phase composition of oxides, forming in the process of oxidation in a wide range of temperatures is discussed. The oxidation mechanism is based on diffusion processes, including the formation of oxides, diffusion of oxygen through the oxide layer into the depth of the metal with change in oxide lattice parameters and in parameters of oxidized metal, and the deceleration or acceleration of rate of oxidation.

AD-615 223 Div. 17/6
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
RESEARCHING DAMPING CHARACTERISTICS OF SOME ALLOYS AT LOW TEMPERATURES,
by A. P. Yakovlev. 16 Apr 65, 11p
FTD-TT-64-1157
TT 65-62223

Unclassified report

Unedited rough draft trans. of Akademiya Nauk URSR, Kiev. Instytut Metalokeramiky i Spetsialnykh Splaviv. Byulleten n8 p199-204 1963.

Descriptors: (*Aluminum alloys, Damping), (*Titanium alloys, Damping), (*Damping, Alloys), Low-temperature research, Cryogenics, Vibration, Test equipment, Pressure.

An investigation was made of the damping characteristics of the aluminum alloys D16 and AMg-6T and also the titanium alloy VT-1D. The logarithmic decrement of damping of the alloys is presented graphically for temperatures- 196C and above.

AD-615 227 Div. 14/2
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
HIGH-ALUMINA POROUS CERAMICS WITH HIGH GAS PENETRABILITY,
by V. D. Tsigler and B. E. Pindrik. 19 Apr 65, 11p FTD-TT-64-1171
TT 65-62227

Unclassified report

Unedited rough draft trans. of Steklo i Keramika (USSR) v21 n1 p22-6 1964.

Descriptors: (*Ceramic materials, Porous materials), Gases, Penetration, Aluminum compounds, Oxides, Titanium compounds, Additives, USSR, Refractory materials, Porosity, Preparation.

The paper establishes norms for the preparation, by the method of burn-out additives, of high-alumina porous irregularly shaped articles having a weight each of 37 kg with high gas penetrability.

AD-615 229 Div. 17/3, 14/7, 14/8
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright Patterson AFB, Ohio.
FRICTION COEFFICIENTS OF MATERIALS FOR GUIDE MACHINES,
by G. B. Lure. 19 Apr 65, 10p FTD-TT-64-1179
TT 65-62229

Unclassified report

Unedited rough draft trans. of Stanki i Instrument (USSR) v30 n3 p17-9 1959.

Descriptors: (*Friction, Materials), (*Metals, Friction), (*Plastics, Friction), (*Graphite, Friction), Iron, Castings, Bronze, Tin alloys, Antimony alloys, Copper alloys, Zinc alloys, Lead, Nylon, Vinyl plastics, Halocarbon plastics, Machines, Coatings.

Experiments were conducted to determine friction in slide guides, operating at feeding rates. A comparative evaluation was made of the antifriction properties of numerous materials used at the present time for strap guides, and also of perspective materials, and values were derived of friction coefficients in dependence upon the duration of the stationary contact and sliding speed. Materials tested during friction along the cast iron

included: metals (cast iron SCH 2.-40, bronze Br. OTSS 6-6-3, babbit B16, zinc alloys TSAM 30-4 and TSAM 10-5); plastics (metallurgical Textolite B, polyamide resin 68 of Nylon type, textolite PT, cordovoloknite 1-G, vinyl plastics, fluoro plastic-4) and graphite coated materials (ferro-graphite, anticorrosion heat conductive ATM material, bronze-graphite, graphite coated material type D, lead saturated.

AD-615 232 Div. 14/4
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
REINFORCING CAPRON FIBER WITH THE AID OF MODIFIED BENTONITE,
by I. O. Uskov and V. P. Solomko. 20 Apr 65, 7p FTD-TT-64-1184
TT 65-62232

Unclassified report

Unedited rough draft trans. of Akademiya Nauk URSR, Kiev. Dopovidi n6 p798-801 1963.

Descriptors: (*Nylon, Clay minerals), (*Clay minerals, Reinforcing materials), Tensite properties, Processing, Sodium compounds, Crystallization.

Investigated was the effect of high dispersion bentonite on the strength of capron fiber. The bentonite was modified by cation exchange with hydrochloride octadecylamine or by the effect of dimethyldichlorosilane. The molecular weight of polycaprolactam changes slightly in the presence of filler. Introduction of small amounts of modified bentonite (about 1%) leads to an increase in strength at 20C by 10-12%. At greater filler concentrations strength decreases, and at 3% filler it becomes lower than in the unfilled polymer. Introduction of non-modified bentonite causes a reduction in strength of the fiber. A rise in test temperature leads to total reduction in strength and reduction in maximum attainable relative reinforcement. Maximum reinforcement at 50C constitutes 7% of the strength of the unfilled fiber at very same temperature, and at 90C strenthening is not observed. (Author)

AD-615 238 Div. 17/5
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
EFFECT OF PRELIMINARY PLASTIC DEFORMATION ON THE BRITTLENESS OF STEEL AT 4.2K,
by O. V. Klyavin and B. I. Smirnov. 26 Apr 65, 8p FTD-TT-64-1237
TT 65-62238

Unclassified report

Unedited rough draft trans. of Fizika Metallov i Metallovedenie (USSR) v16 n1 p134-5 1963.

Descriptors: (*Cryogenics, Steel), (*Steel, Brittleness), (*Deformation, Steel), USSR, Stresses, Mathematical analysis, Strain (Mechanics).

AD-615 241 Div. 14/9, 4/3
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
NEW WAYS OF SYNTHESIZING RUBBER,
by B. A. Dolgoplosk. 26 Apr 65, 16p FTD-TT-64-1257
TT 65-62241 Unclassified report

Unedited rough draft trans. of Priroda (USSR) v52 n5 p30-5 1963.

Descriptors: (*Synthetic rubber, Synthesis (Chemistry)), (*Elastomers, Synthesis (Chemistry)), Polyethylene plastics, Isoprene, Polymerization, Halocarbon plastics, Silicone plastics, USSR.

A general, semi-technical, review is given of methods for the preparation of various types of synthetic rubber. Special attention is given to materials for use in demanding environments.

AD-615 242 Div. 14/7
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SOME METHODS OF DEPOSITING METALS ON PLASTICS,
by V. A. Voskresenskii and F. F. Faizullin.
26 Apr 65, 9p FTD-TT-64-1259
TT 65-62242

Unclassified report

Unedited rough draft trans. of Kazan Univ. Uchenye Zapiski (USSR) v116 n5 p69-72 1956.

Descriptors: (*Metal coatings, Electrodeposition), (*Plastics, Metal coatings), USSR, Graphite, Copper, Nickel, Silver, Sandwich construction, Platings.

An investigation experimentally established the possibility of electrically depositing of metals on the surface of plastics with the application of a graphite current-carrying sublayer in accordance with the scheme: plastic material coated by current-carrying graphite sublayer coated by intermediate copper layer coated by basic galvanic coating (Ni, Ag, and others). There was selected a formula for the current-carrying graphite mass, mode of applying it, and hardening it, and the formulas for the electrolytes were refined. The method described enables one to extend the field of the application of plastics in industry. (Author)

AD-615 243 Div. 14/8, 04/3
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
POLYMERS WITH CONJUGATED BONDS AND HETERO-ATOMS IN A CONJUGATED CHAIN,
by A. A. Berlin and T. V. Kostroma. 26 Apr 65, 14p FTD-TT-64-1261
TT 65-62243

Unclassified report

Unedited rough draft trans. of mono. Geterotsepnye Vysokomolekulyarnye Soedineniya (Heterochain High Molecular Weight Compounds) Moscow, 1963, p53-8.

Descriptors: (*Heat-resistant plastics, Preparation), (*Ferrocenes, Polymerization), (*Metalorganic compounds, Polymers), (*Salicylates, Polymers), Complex compounds, Beryllium compounds, Iron compounds, Aluminum compounds, Magnesium compounds, Silver compounds, Copper compounds, Stability, Thermal properties, Magnetic properties, Electrical conductance, USSR.

Salicyl derivatives of ferrocene were obtained that were never described before. Polymer chelate complexes were obtained of tetrasalicylates of ferrocene with copper, beryllium, bi- and tetravalent iron, aluminum and magnesium, and complex compounds and

disal cyl ferrocene with silver and copper. The thermal stability of the complexes obtained was determined and it was shown that the greatest resistance to heat is possessed by complexes with beryllium, as well as with Mg and Al, which stand heating up to 200C without significant loss in weight. The least thermal stability was observed in the case of complexes with copper, which at 200C in the course of 5 minutes, lose 30% of their weight. It was established that the complexes of salicylates of ferrocene, in contrast to the corresponding monomer products, possess considerably higher magnetic susceptibility and higher electrical conductivity. (Author)

AD-615 245 Div. 14/5
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
NATURE OF POLYSILOXANES AND ITS EFFECT ON THEIR ACTION AS ADMIXTURES TO HYDROCARBON LUBRICATING AGENTS,
by G. V. Vinogradov, N. S. Nametkin, and M. I. Nosov. 26 Apr 65, 12p FTD-TT-64-1268
TT 65-62245

Unclassified report

Unedited rough draft trans. of Neftekhimiya (USSR) v4 n2 p345-50 1964.

Descriptors: (*Lubricant additives, Siloxanes), (*Siloxanes, Lubricant additives), Hydrocarbons, Polycyclic compound, Wear resistance, Friction, Stability, USSR.

To explain the effect of the nature of polysiloxanes on the improvement of the lubricating effect of hydrocarbons during their addition into same, the antiwear and antifriction properties of mixtures of 1, 1-di(o-xylyl)-ethane with polyethylsiloxane, polymethylsiloxane and two polymethylphenylsiloxane liquids were investigated. Mutual strengthening of the lubricating effect of polysiloxanes and hydrocarbons depends to a large degree upon the nature of polysiloxanes, which by degree of reducing their activity as admixtures, improving the lubricating qualities of hydrocarbons, are arranged in the following series: Polyethylsiloxane > polymethylsiloxane > polymer 1 > polymer 2. An assumption was made that this is connected with a rise in thermooxidizing stability during the change in polysiloxane chanins of ethyl side groups into methyl and phenyl. Mutual strengthening of the lubricating effect of hydrocarbons and polysiloxanes may appear not only then when they are soluble in each other but also when they are emulsified in hydrocarbon media. (Author)

AD-615 248 Div. 14/7
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
METHOD OF PREPARATION OF COATINGS,
by I. S. Okhrimenko, V. A. Myshlennikova, and Yu B. Shleomenzon. 27 Apr 65, 5p FTD-TT-64-1278
TT 65-62248

Unclassified report

Unedited rough draft trans. of Russian Patent 151739, pub. 11 Sep 61, appl. 744306/23-4.

Descriptors: (*Plastic coatings, Halocarbon plastics), (*Halocarbon plastics, Plastic coatings), Metals, Corrosion inhibition, Fluorine compounds, Preparation, Colloids, Patents, USSR.

The object of the invention is a method of obtaining coatings on metal on the basis of organic dispersion of polymers containing fluorine which is distinguished by the fact, that for the purpose of expanding the assortment of applicable polymers, one uses for the latter fluorine rubber SKF-32. (Author)

AD-615 250 Div. 14/5
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
METHOD OF IMPROVING THE ANTIWEAR PROPERTIES OF LUBRICATING OILS,
by V. S. Demchenko, E. N. Guryanova, and O. I. Bogdanova. 19 Apr 65, 5p FTD-TT-64-1287
TT 65-62250

Unclassified report

Unedited rough draft trans. of Russian Patent 158038, pub. 23 Jun 62, appl. 783882/23-4.

Descriptors: (*Lubricant additives, Thiazoles), (*Thiazoles, Lubricant additives), (*Lubricants, Wear resistance), Thiols, Organic nitrogen compounds, Patents, USSR.

The object of the invention is a method improving the antiwear properties of lubricating oils which is distinguished by the fact that as additives one introduces derivatives of 2-mercaptobenzthiazole, for example, benzthiazole-2-cyclohexylsulfenamid. (Author)

AD-615 256 Div. 17/4
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
INVESTIGATION OF THE RESISTANCE TO PLASTIC DEFORMATION ON THE PART OF CHROMIUM WITH MOLYBDENUM BY THE METHOD OF HOT HARDNESS,
by D. A. Prokoshkin, M. P. Matveeva, and V. A. Morozov. 29 Apr 65, 9p FTD-TT-64-1297
TT 65-62256

Unclassified report

Unedited rough draft trans. of Issledovaniya po Zharoprochnym Splavam (USSR) v7 p210-3 1961.

Descriptors: (*Chromium alloys, Deformation), (*Molybdenum alloys, Chromium alloys), USSR, Creep, Hardness, High-temperature research.

AD-615 258 Div. 14/9, 25/7
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
NUCLEAR RESONANCE SPECTROSCOPY OF ELASTOMER SOLUTIONS,
by N. M. Sergeev and V. L. Karpov. 30 Apr 65, 10p FTD-TT-64-1333
TT 65-62258

Unclassified report

Unedited rough draft trans. of Vysokomolekulyarnye Soedineniya (USSR) v6 n2 p310-3 1964.

Descriptors: (*Synthetic rubber, Nuclear magnetic resonant), (*Elastomers, Nuclear magnetic resonance), (*Nuclear magnetic resonance, Elastomers), Rubber, Polyethulene plastics, Solutions, Microwave spectroscopy, Protons, Solvents, Carbon tenrachloride, Aromatic compounds, USSR.

Nuclear magnetic resonance spectra at 25 Mc/s of the

elastomers polyisobutylene, polybutadiene (SKB), divinyl rubber and natural rubber were obtained for their solutions in CC14 and partly in benzene. For polyisobutylene solutions, a study of the dependence of the CH3 peak width upon the concentration of the solution showed that the width tends to a limiting value of ca. 5 c/s at infinite dilution, the value apparently not being connected with the reduced viscosity. The chemical shifts of the characteristic groups of the polymers are given. A chemical shift for the protons was found directly in block polybutadiene SKB. A method for determining the composition of polybutadiene by means of NMR spectra is proposed. (Author)

AD-615 288 Div. 14/5, 26/5
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
AT THE TECHNICAL-ECONOMICAL COUNCIL OF THE LENINGRAD SOVNARKHOZ,
by Ya. K. Terentev. 23 Apr 65, 6p
FTD-TT-64-1242
TT 65-62261

Unclassified report

Unedited rough draft trans. of Byulleten Tekhniko-Ekonomicheskoi Informatsii (USSR) n2 p76-7 1964.

Descriptors: (*Molybdenum compounds, Sulfides), (*Cutting tools, Lubricants), (*Dies, Lubricants), Wear resistance, Films, Friction, USSR.

Information regarding the use of molybdenum disulfide as an antifriction coating was reported to the technological section of machine construction of the technical-economical soviet of the Leningrad Sovnarkhoz (Council of National Economy). The use of molybdenum disulfide is reported to increase, by an average of 2 to 3 times, the stability of cutting tools and dies.

AD-615 296 Div. 14/5
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
METHOD OF PRODUCING GRAPHITE LUBRICANTS,
by A. S. Fialkov and I. V. Temkin. 28 Apr 65, 6p FTD-TT-64-1290
TT 65-62269

Unclassified report

Unedited rough draft trans. of Russian Patent 159808 11 Jun 62, appl. no. 782 150/23-4.
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Descriptors: (*Lubricants, Graphite), (*Graphite, Lubricants), USSR, Patents, Manufacturing methods, Heat treatment, Particles, Material separation.

The object of the invention is a method of obtaining graphite lubricants by means of grinding graphite to the colloidal state. The ground graphite is subjected to thermal treatment at 2,600--3,000 C to increase the antifriction properties.

AD-615 297 Div. 14/5
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
METHOD OF PRODUCING NONFLAMMABLE LUBRICANTS FOR TURBINES,
by K. I. Ivanov, E. D. Vilyanskaya, and L. N. Kirichenko. 28 Apr 65, 6p FTD-TT-64-1291
TT 65-62270

Unclassified report

Unedited rough draft trans. of Russian patent 159-922, pub. 13 Dec 62, appl. 807 683/23-4.

Descriptors: (*Lubricants, Turbines), USSR, Patents, Foaming inhibitors, Lubricant additives, Antioxidants, Oils, Fluorination, Organic phosphorus compounds, Phosphates, Sulfides, Amines, Organic sulfur compounds, Aromatic compounds.

The object of the invention is a method of obtaining a fire-resistant liquid for turbines on the basis of compounds containing phosphorus with additives. To improve the quality of the product and reduce its cost, trixylinyl-phosphate is used as the phosphorus compound, perfluorinated transformer oil as an antifoaming additive and 4.4(1)-diamino-diphenyl-disulfide as an antioxidant.

AD-615 308 Div. 14/6, 30/5
CFSTI Prices: HC$1.00 MF$0.50

Naval Applied Science Lab., Brooklyn, N. Y.
EVALUATION OF VOID CONTENT IN EPOXY-GLASS FILAMENT WOUND MATERIAL BY MICROWAVE TESTS.
Technical memo.
1965, 10p Lab. proj. 6188-1-TM-1
Proj. SF007 03 04, Task 1008

Unclassified report

Descriptors: (*Test methods, Composite materials), (*Composite materials, Filament wound construction), (*Filament wound construction, Composite materials), (*Epoxy plastics, Composite materials), Glass textiles, Dielectric properties, Non-destructive testing, Interferometers, Microwave bridges.

Several selected samples of epoxy-glass filament wound material were tested in free space by microwave measurement techniques. The purpose of these tests was to seek significant relationships between percentage of void content and dielectric properties for practical application in nondestructive test procedures. The test results revealed that substantial amounts of void content in the test samples caused very small changes in the measured value of dielectric constant. Furthermore, these changes could not be distinguished from the effects of various other factors related to the test. Therefore it was concluded that the free space measurement of dielectric constant was unsatisfactory as in indication of the distributed void content of the subject material. (Author)

AD-615 327 Div. 17/2, 25/4
CFSTI Prices: HC$1.00 MF$0.50

Northwestern Univ., Evanston, Ill. Dept. of Materials Science.
EVALUATION FROM X-RAY DIFFRACTION PROFILES OF FOURIER COEFFICIENTS AND THE MICROSTRAIN DISTRIBUTION FUNCTION,
by R. J. de Angelis. 10 May 65, 23p
Technical rept. no. TR-6
Contract Nonr122820, Proj. NR031 680

Unclassified report

See also AD-291 048.

Descriptors: (*X-ray diffraction analysis, Fourier analysis), (*Fourier analysis, X-ray diffraction analysis), (*Statistical functions, X-ray diffraction analysis), Programming (Computers), Series.

AD-615 345 Div. 14/6
CFSTI Prices: HC$1.00 MF$0.50

Harvard Univ., Cambridge Mass. Div. of Engineering and Applied Physics.
ON THE ELASTIC MODULI OF SOME HETEROGENEOUS MATERIALS,
by Bernard Budiansky. Mar 65, 10p
Technical rept. no. TR-22
Contract Nonr186602
Unclassified report

Descriptors: (*Composite materials, Elasticity), (*Elasticity, Composite materials), Mathematical analysis.

A heuristic analysis is given for the determination of the elastic moduli of a composite material, the several constituents of which are each isotropic and elastic. The results are intended to apply to heterogeneous materials composed of contiguous, more-or-less spherical grains of each of the phases. (Author)

AD-615 425 Div. 17/5, 17/2, 26/1
CFSTI Prices: HC$5.00 MF$1.00

Mellon Inst., Pittsburgh, Pa.
CORRELATION OF WELD MICROSTRUCTURES WITH FRACTURE TOUGHNESS OF 18% NICKEL (250) GRADE MARAGING STEEL,
by J. B. Tobias and G. K. Bhat. 28 Feb 65, 156p
Contract Nonr459500X
Unclassified report

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Descriptors: (*Maraging steels, Fracture (Mechanics)), (*Metallography, Maraging steels), (*Welds, Maraging steels), Nickel alloys, Titatium alloys, Molybdenum alloys, Cobalt alloys, Toughness, Metal plates, Welding, Microstructure, Fractography.

A program designed to obtain a correlation between fracture toughness and microstructural features of 18% nickel maraging steel plate weldments prepared by various techniques has been partially completed. Results of this study have shown that the center-of-the-weld possesses the lowest fracture toughness for all weldments and that the welding techniques giving rise to successively decreasing weldment fracture toughness may be listed as follows: Big Tig, Tig, Mig, and submerged-arc. Macrostructural and microstructural examinations of typical weldments, as well as examination of macro-topographies and micro-topographies of fractures of weldments prepared by these four techniques, have shown that submerged-arc weldments present lower resistance to crack travel than do the weldments of the multi-pass inert gas shield arc techniques. In addition, the embrittling and cracking problem in submerged-arc weldments have been tentatively associated with the formation of an ordering AlTi phase. (Author)

AD-615 519 Div. 17/2
CFSTI Prices: HC$3.00 MF$0.75

Boeing Scientific Research Labs., Seattle, Wash.
STATISTICAL THEORY FOR GRAIN BOUNDARY SELF-DIFFUSION IN METALS,
by C. M. Carlson. Jan 65, 54p
Rept. no. D1-82-0353
Unclassified report

Also available from the author.

Descriptors: (*Metals, Grain boundaries), (*Grain boundaries, Diffusion), Grain structures (Metallurgy), Metallic crystals, Crystal structure, Crystal lattices, Crystal lattice defects, Statistical analysis, Liquid metals, Atomic energy levels, Theory.

A disordered liquid-like defect model for grain boundary self-diffusion in metals is described. This model is based upon a simple liquid lattice approach formulated for liquid metals in a previous document and reviewed in the first section of the current document. The model assumed for the disordered defect in the grain boundary consists of four atoms which occupy six defect sites. It is shown that this model yields reasonable values for the energies of atoms in the region α the defect and the D sub o factor in the expression for the coefficient of self-diffusion along the grain boundary. (Author)

AD-615 524 Div. 17/4
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
INVESTIGATION OF METALS IN LIQUID AND SOLID STATES: SELECTED ARTICLES.
18 May 65, 21p FTD-MT-65-103
TT 65-62293
Unclassified report

Edited machine trans. of mono. Issledovaniya Metallov v Zhidkom i Tverdom Sostoyaniyakh, Moscow, 1964 p241-54.

Descriptors: (*Tungsten alloys, Niobium alloys), (*Niobium alloys, Physical properties), (*Refractory metals, Oxidation), Reaction kinetics, Microstructure, Hardness, Tantalum alloys, Molybdenum alloys, Grain boundaries, Sintering, Creep, USSR, Phase studies.

An investigation was made of the kinetics of oxidation of binary alloys of tungsten, containing up to 50% Nb by weight. Niobium alloys containing various proportions by weight of Ta and Mo were studied.

AD-615 544 Div. 17/4, 17/1, 26/1
CFSTI Prices: HC$4.00 MF$1.00

Climax Molybdenum Co. of Michigan, Detroit.
RESEARCH AND DEVELOPMENT ON NEW PROCESSES OF PRODUCING DUCTILE MOLYBDENUM.
Final rept. for 1 Nov 61-31 Oct 64,
by M. Semchyshen, Robert Q. Barr, and A. Phillip Coldren. 31 Apr 65, 140p
Contract NOrd15915
Unclassified report

See also AD-414 829.

Descriptors: (*Molybdenum, Purification), (*Powder metallurgy, Molybdenum), (*Purification, Molybdenum), (*Refining (Metallurgy), Molybdenum), Transition temperature, Casting, Ductility, Powder metals, Impurities, Additives, Melting, Furnaces, Deoxidation (Metallurgy), Aluminum alloys, Chromium alloys, Nickel alloys, Hardness, Rolling (Metallurgy), Sheets, Extrusion, Recrystallization, Fractography, Thorium, Neodymium.

Studies were conducted on a laboratory scale with the objective of lowering the transition temperature of arc-cast molybdenum by improving the purity of arc-cast

molybdenum and by additions of elements which would tend to mitigate the deleterious effect of interstitial impurities. Molybdenum powder was prepared by reducing high-purity MoO2Cl2 prepared under laboratory conditions, by chlorinating MoO2, then converting the dioxy-dichloride to ammonium polymolybdate. The latter was reduced to metallic powder in palladium-diffused hydrogen. The powder was consolidated by nonconsumable arc-melting, followed by rolling to sheet. Although the purity of the powder was extremely high, the ductility of the rolled sheet was not particularly good owing to contamination that occurred during melting and to the small amount of total reduction achieved by rolling. An attempt was made to purify molybdenum in the solid state in high-purity atmospheres at elevated temperatures. The purity of the solid samples was monitored by hardness and bend tests and by chemical analyses. Vacuum-arc-cast ingots were prepared using powder that had been treated in palladium-diffused hydrogen, then transferred to the melting furnance without exposure to air. Additions were made to the ingots so that various deoxidizing agents could be studied.

AD-615 561 Div. 17/2
CFSTI Prices: HC$2.00 MF$0.50

Stanford Univ., Calif.
ELASTIC AND PLASTIC PROPERTIES OF CRYSTALLINE SOLIDS AT ELEVATED TEMPERATURE.
Interim rept. for Oct 59-Sep 64,
by Jack L. Lytton, John A. Hren, Kenneth T. Kamber, Alan J. Ardell, and Craig R. Barrett. Jan 65, 42p
Contract AF33 616 6789, Proj. 7021, Task 702105
ARL 65-3

Unclassified report

Descriptors: (*Ferromagnetic materials, Creep), Iron, Cobalt, Nickel, Iron alloys, Cobalt alloys, Aluminum alloys, Copper alloys, Zinc alloys, Plasticity, Elasticity, Grain boundaries, Crystal substructure, Tensile properties, Diffusion, Stresses, High-temperature research.

It was shown that the strength of pure polycrystalline metals at elevated temperature is controlled primarily by the rate of atomic mobility and the elastic modulus. The apparent activation energy for creep is shown to be greater than that for self-diffusion. If appropriate corrections are made for the change of elastic modulus with temperature, then the activation energy for creep is equal to that for self-diffusion. As a result of this investigation, new creep and stress-rupture parameters are proposed. Ferromagnetism or order can play an important role in increasing the high temperature strength of crystalline solids. The elastic and plastic properties of ferromagnetic Fe, Co, Ni and ordered FeCo, Fe3Al and CuZn were evaluated. The elastic and plastic properties of polycrystalline copper were studied in the temperature range from 400 to 950C. The types of substructure developed during high temperature creep of highly textured polycrystalline Fe - 3% Si sheet were examined by electro-etching of dislocation sites.

AD-615 566 Div. 17/6
CFSTI Prices: HC$1.00 MF$0.50

Frankford Arsenal, Philadelphia, Pa.
STRESS-CORROSION TESTS ON COMMERCIAL AND HIGH PURITY GRADE 7075-T6 ALUMINUM ALLOY.
Memo. rept.,
by Helen R. Pritchard. May 65, 11p Memo. no. M65-17-1
Proj. 1C024401A110

Unclassified report

Descriptors: (*Aluminum alloys, Corrosion), (*Corrosion, Aluminum alloys), Stresses, Failure (Mechanics), Fracture (Mechanics), Zinc alloys, Magnesium alloys, Tensile properties, Metal plates, Armor, Tests, Life expectancy, Impurities.

Alternate immersion stress-corrosion tests were conducted on commercial and high purity 7075-T6 aluminum alloy stressed in the short transverse direction at levels of 8000 psi to yield strength. No failures occurred in the commercial grade at stress levels of 20,000 psi or less. In the high purity grade, the highest stress which did not produce failures was 10,000 psi. At levels of 30,000 psi or less, the commercial grade specimens had a life of three or more times that of the high purity specimens. (Author)

AD-615 577 Div. 14/2, 12/5
CFSTI Prices: HC$1.00 MF$0.50

Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
AN EXPERIMENTAL STUDY OF THE LIQUID LAYER INSTABILITIES OF AN ABLATING BODY,
by L. Bourely and R. W. Johnson. Apr 65, 20p
Technical rept. no. TR-12, SUDAER-232
Contract Nonr22530, Proj. NR064 425

Unclassified report

Descriptors: (*Ablation, Glass), (*Heat-resistant glass, Ablation), (*Glass, Ablation), (*Reentry vehicles, Aerodynamic heating), Atmosphere entry, Stagnation point, Models (Simulations), Stability, Pressure, Temperature, Nozzles, Liquids.

The paper presents experimental evidence which shows that for pyrex and soda-lime glass, ring wave instability occurs at high stagnation pressure and temperature. It demonstrates that for a similar nylon model the ablation process is different. In light of the observations made during the test series, the importance of the parameters involved is discussed. (Author)

AD-615 591 Div. 17/4
CFSTI Prices: HC$3.00 MF$0.75

Southern Research Inst., Birmingham, Ala.
MECHANICAL AND PHYSICAL PROPERTIES OF TZM MOLYBDENUM ALLOY SHEET AND OF TUNGSTEN SHEET.
Quarterly progress rept. no. 10, 1 Mar-1 May 65.
28 May 65, 53p Rept. no. 7306-1479-X
Contract N600 19 59530

Unclassified report

See also AD-612 759.

Descriptors: (*Sheets, Refractory metal alloys), (*Molybdenum alloys, Sheets), (*Tungsten, Sheets), (*Refractory metal alloys, Sheets), Tensile properties, Titanium alloys, Zirconium alloys, Carbon alloys, Mechanical properties, Deformation, Recrystallization, Welding, Physical properties, Elasticity, Thickness.

Notched- and unnotched-tensile evaluations were made for determination of the notched-tensile brittle-ductile transition temperature on the 0.060-in. tungsten sheet and the 0.040-in. TZM sheet as scheduled in the original scope of the program. Density measurements were made on the different sheets of various thicknesses of the tungsten and TZM material evaluated under the original scope of the program. Elevated-temperature unnotched-tensile evaluations at 2200, 2500, and 3000F were conducted on the TZM sheet as specified in the extended

phase of the TZM program. The notched- and unnotched-tensile evaluations for analysis of the notched-tensile brittle-ductile transition temperature among different sheets and heats were also completed for the extended work on the TZM sheet. Arrangements were made to weld coupons of the 0.040-in. TZM and the 0.060-in. tungsten sheet by the TIG process and to weld coupons of 0.040-in. TZM sheet by the electron beam process for subsequent evaluation of the mechanical properties of the welded sheet.

AD-615 595 Div. 14/8, 04/3
CFSTI Prices: HC$4.00 MF$1.00

Mellon Inst., Pittsburgh, Pa.
THE DEPENDENCE OF THE VISCOELASTIC MECHANICAL PROPERTIES OF POLYMERIC MATERIALS ON MOLECULAR AND MORPHOLOGICAL STRUCTURE.
Technical rept. no. 13, 1 Sep 64-28 Feb 65.
28 Feb 65, 148p
Contract Nonr269300, Proj. NR356 407
Unclassified report

Descriptors: (*Polymers, Mechanical properties), (*Plastics, Viscoelasticity), (*Polyamide plastics, Spectra (Infrared)), (*Styrene plastics, Molecular structure), (*Polyethylene plastics, Mechanical properties), Crystallization, Iodine, Potassium compounds, Iodides, Creep, Thermal properties, Crystal structure, Internal friction, Synthesis (Chemistry), Metalorganic compounds.

Contents:
Studies of crystallization in polymers
(An infrared study of the interaction of polyamides with iodine in iodine-potassium iodide solution)
Studies of mechanical properties of polymers
(Temperature dependence of the viscoelastic behavior of polystyrene)
(Polyethylene--mechanical properties vs. morphology)
Star and comb type branched polystyrenes
(The preparation and characterization of some star- and comb-type branched polystyrenes).

AD-615 599 Div. 17/2, 12/1
CFSTI Prices: HC$2.00 MF$0.50

Lockheed Missiles and Space Co., Sunnyvale, Calif.
BERYLLIUM APPLICATIONS IN STRUCTURAL DESIGN,
by L. A. Riedinger and R. E. Foster. Jan 58, 29p
Rept. no. LMSD-2643
Unclassified report

Presented at the Annual Meeting of the American Astronautical Society (4th) in New York City, January 29-31, 1958.

Descriptors: (*Beryllium, Structural properties), (*Guided missile components, Beryllium), (*Spacecraft, Beryllium), Thermal properties, Physical properties, Mechanical properties, Buckling (Mechanics), Stresses, Thermal stresses, Weight.

General weight, strength, and thermal properties of beryllium are discussed. Examples of beryllium application are given which show both weight savings and reduction of thermal stresses in high temperature environments. Specific weight reductions are demonstrated for a ballistic missile and a lunar rocket.

AD-615 600 Div. 14/6, 14/4, 14/8
CFSTI Prices: HC$3.00 MF$0.75

Hughes Aircraft Co., Culver City, Calif.
RIGIDIZATION TECHNIQUES FOR INTEGRALLY WOVEN COMPOSITE CONSTRUCTIONS.
Rept. for Jul 63-Jul 64,
by L. B. Keller and S. Schwartz. Sep 64, 77p
Contract AF33 657 11287, Proj. 7381, Task 738101
ML TDR-64-299
Unclassified report

Descriptors: (*Glass textiles, Reinforcing materials), (*Plastics, Reinforcing materials), (*Sandwich construction, Composite materials), Space environmental conditions, Expanded plastics, Isocyanate plastics, Polyester plastics, Impregnation, Gelatins, Construction, Heat treatment, Catalysis, Materials.

The report describes the investigation of methods to erect and rigidize three-dimensional woven fiberglass sandwich under space conditions; and to determine the physical properties of the rigidized sandwich material. The investigation included both triangular and rectangular fluted woven sandwich in weights from 12 to 23 ounce per square yard. Impregnating or rigidizing materials and processes included gelatin rigidized by solvent loss, gas catalyzed polyurethane, ultraviolet activated polyesters, and heat activated single component polyurethane foam powder. Methods for impregnating, storing, and automatically erecting and rigidizing the sandwich materials were developed successfully for all of the chemical rigidizing systems Density of the space rigidized materials varied from 2 to 8 pounds per cubic foot depending on system, weight of cloth, and resin content. Strengths obtained were of the same order of magnitude as other conventional lightweight structural materials. (Author)

AD-615 620 Div. 17/2, 17/6, 17/7
CFSTI Prices: HC$3.00 MF$0.75

Institute of Metals and Explosives Research, Univ. of Utah, Salt Lake City.
INVESTIGATION OF THE RECRYSTALLIZATION BEHAVIOR OF DILUTE ALLOYS OF MAGNESIUM AND CHROMIUM,
by Charles H. Pitt, Ernest L. Moore, Charles R. Brinkman, and Theron G. Odekirk. Dec 64, 72p
Technical rept. no. TR-1
Grant AF AFOSR39 63
AFOSR 65-0755
Unclassified report

Descriptors: (*Magnesium alloys, Recrystallization), (*Chromium alloys, Recrystallization), (*Magnesium, Recrystallization), (*Recrystallization, Metallic crystals), Crystal lattice defects, Crystal structure, Crystal lattices, Grain boundaries, Heat of activation, X-ray diffraction analysis, Rolling (Metallurgy), Solid solutions, Nucleation, Foils, Electron microscopy, Graphics.

An investigation into the recrystallization behavior of pure magnesium and some of its dilute binary alloys and pure chromium was made. Techniques for preparing thin foils of magnesium suitable for examination in the electron microscope were developed and photographs taken of dislocations, nucleation of dislocations and migrating grain boundaries. An x-ray technique was developed to measure the degree of recrystallization of magnesium and it was found that surface recrystallization played an important part in the recrystallization process. Activation energies determined for surface recrystallization in magnesium and its alloys range from 28 to 31

kilocalories per mole while that for bulk recrystallization was 20 kilocalories per mole. Determination of the percent recrystallization in pure chromium was done by a microscopic technique. The activation energy for the recrystallization of pure chromium (99.997%) was found to be 76 kilocalories per mole. (Author)

AD-615 633 Div. 17/6, 26/1
CFSTI Prices: HC$3.00 MF$0.75

Battelle Memorial Inst., Columbus, Ohio.
STUDIES OF REACTIONS OCCURRING DURING BETA HEAT TREATMENT OF TITANIUM.
Final rept.,
by J. J. English, D. N. Williams, and H. R. Ogden.
14 May 65, 61p
Contract N161 25953

Unclassified report

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Descriptors: (*Titanium alloys, Heat treatment), Aluminum alloys, Niobium alloys, Toughness, Tensile properties, Shock resistance, Impact shock, Grain structures (Metallurgy), Grain boundaries, Thermal properties, Welding, X-ray diffraction analysis.

Thermal dilation anomalies occur when certain titanium alloys are repeatedly cycled through the allotropic transformation. These anomalies were related to the orientations of the alpha and beta phases which form during the transformation. On heating or cooling the Ti-7Al-3Cb-0.06 O2 and Ti-7Al-3Cb-0.12 O2 alloys through the transformation temperature range, the thermal dilation curves may show an expansion, contraction, or no discontinuous length change, depending on the orientation of the phases. The type of expansion behavior may have a significant effect both on toughness and weldability. Impact strengths of the 7Al-3Cb titanium alloys at -80 F can be improved 3 to 5 foot-pounds by slowly heating and cooling the alloys through the transformation in vacuum. This improved impact strength is believed to be related to a decrease in hydrogen content. (Author)

AD-615 636 Div. 17/2, 25/2
CFSTI Prices: HC$4.00 MF$1.00

Ohio State Univ. Research Foundation, Columbus.
GRAIN BOUNDARY RELAXATION IN FOUR HIGH PURITY, FACE-CENTERED CUBIC METALS.
Final rept. for 1 Mar 63-1 Mar 65,
by James N. Cordea and Joseph W. Spretnak.
Apr 65, 148p Technical rept. no. TR-2
Contract AF33 657 7656, Proj. 7351, Task 735106
ML TR-65-116

Unclassified report

Descriptors: (*Aluminum, Grain boundaries), (*Nickel, Grain boundaries), (*Copper, Grain boundaries), (*Silver, Grain boundaries), Crystal structure, Metallic crystals, Internal friction, Grain structures (Metallurgy), Metallography, Crystal lattice defects, Atomic structure, Tensile properties, Creep, Heat of activation, Functional analysis, Statistical functions, Oxygen, Reviews.

The grain boundary relaxation in high purity aluminum, nickel, copper, and silver was studied by means of a low frequency torsion pendulum. Both internal friction and creep at constant stress tests were conducted on all the metals. A lognormal distribution in relaxation times was used to explain the relativity wide experimental internal friction peaks and the gradual relaxation behavior during the creep tests. The lognormal distribution in relaxation times was separated further into a lognormal distribution of relaxation time constants and a normal distribution in activation energies. A spread of from ± 4 to ± 6 Kcal/mole accounted forthe major part of the distribution. The distribution parameter was observed to increase with increasing grain size in copper. Grain boundary segregation is suspected to be the cause. A 'double peak' internal friction phenomenon observed in copper is explained by the segregation of minute quantities of oxygen to the grain boundary. The preferred orientation of grains in the wire specimens also appears to be an important factor. A similar double peak was also observed in high purity silver. The activation energy of the second peak is H sub m = 55.5 ± 4 Kcal/mole. (Author)

AD-615 662 Div. 14/6, 14/2, 17/7
CFSTI Prices: HC$2.00 MF$0.50

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
RESEARCH ON FIBER-REINFORCED COMPOSITES,
by J. Chorne, W. H. Sutton, A. Gatti, R. Mehan, and H. Rauch. May 65, 28p Rept. no. R65SD18

Unclassified report

Presented at Refractory Composites Working Group Meeting (10th), held at Georgia Inst. of Tech., Atlanta, 12-14 Apr 65.

Descriptors: (*Fiber metallurgy, Composite materials), (*Composite materials, Reinforcing materials), (*Reinforcing materials, Fibers), (*Filaments, Reinforcing materials), Ceramic materials, Graphite, Boron compounds, Carbides, Refractory materials, Nickel alloys, Nickel, Aluminum compounds, Oxides, Silver, Aluminum, Sapphires, Bonding, Surface-active substances, Tensile properties, Manufacturing methods.

The Space Sciences Laboratory of the General Electric Company has been conducting investigations on the preparation and properties of fibers and fibrous composites for more than five years. Much of the original effort was directed towards the growth and properties of whiskers (short, single crystal fibers) and towards the development of high strength metals reinforced with these whiskers. While these investigations are continuing, additional programs have been undertaken which include the preparation of high modulus continuous filaments, a study of the wetting and bonding of metals to (oxide) whiskers, the development of effective composite fabrication procedures, and the evaluation of composite properties in terms of their potential properties. This report briefly summarizes some of the current results of six programs, sponsored by government agencies, which are being conducted at the Metallurgy and Ceramics Research Operation of the Materials Sciences Section, Space Sciences Laboratory. (Author)

AD-615 723 Div. 14/6
CFSTI Prices: HC$3.00 MF$0.75

Arizona Univ., Tucson. Dept. of Civil Engineering.
THE EFFECTS OF CONTINUOUS VIBRATION OF CONCRETE DURING INITIAL SET.
Master's thesis,
by Joseph B. Ornowski, Jr. 1965, 74p

Unclassified report

Descriptors: (*Concrete, Vibration), Chemical reactions, Experimental data, Compressive properties, Tensile properties, Analysis, Reviews.

An experimental evaluation was made of the effects of continuous vibration of plain concrete as it undergoes initial set. A review of previous research on the subject is presented and this study is an extension of that work.

The data from experimental work are reported to show the relationships between the length of continued vibration, setting, and the maximum difference in compressive strength of vibrated and unvibrated concrete specimens. (Author)

AD-615 757 Div. 17/2
CFSTI Prices: HC$2.00 MF$0.50

Pennsylvania Univ., Philadelphia. Lab. for Research on the Structure of Matter.
MICROYIELDING IN IRON AT LOW TEMPERATURES, by Ram Kossowsky and Norman Brown. 30 Mar 65, 36p
Contract NONR55120

Unclassified report

Descriptors: (*Iron, Tensile properties), (*Crystal lattice defects, Iron), (*Elasticity, Iron), Low-temperature research, Cryogenics, Stresses, Loading (Mechanics), Metallography, elasticity, Plasticity, Deformation.

The micro and macro yielding of zone refined polycrystalline iron was investigated between 298 and 5K. The elastic limit became temperature sensitive below 50K so that its value at 0K was about twice its 5,000 psi tensile value at 298K. The stress to produce a permanent strain of about 10 to minus 6th power was more temperature sensitive with an increase of 8,000 to 14,000 psi between 298 and 0K. The stress for macro yielding increased about 120,000 psi between 298 and 0K. The results have been interpreted in terms of three Peierls-Nabarro forces, one for existing kinks another for the motion of screw dislocations on a constant slip plane, and the third for motion onto another slip plane. Impurities play a role with the Peierls-Nabarro force in determining the microyield points. The large 120,000 psi increase in macroyield point between 298 and 0K is attributed to the P-N-F for cross-slip which causes a high internal stress field to be built up prior to macro-yielding. (Author)

12. Mathematical Sciences

AD-615 226 Div. 15/1
CFSTI Prices: HC$2.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
LINEAR DIFFERENTIAL EQUATIONS WITH DELAY DEPENDING LINEARLY UPON ARGUMENT,
by K. G. Valeyev. 16 Apr 65, 29p FTD-TT-64-1167 TT 65-62226
Unclassified report

Unedited rough draft trans. of Sirbirskii Matematicheskii Zhurnal (USSR) v5 n2 p290-309 1964.

Descriptors: (*Differential equations, Time-lag theory), USSR.

In this report is explained a sufficiently complete theory of linear differential equations with constant coefficients and delays of the argument, which appear to be linear functions of the argument. Discussed are analytical properties of solutions, their images according to Laplace, representation of solutions and their descriptions in form of definite series. Especially separated was a simple case when the delays are directly proportional to the argument. Greater attention was devoted to problems of stability of the solutions. The proposed theory can be, for example, used when investigating continuous control of escaping objects from distances, when the delay cannot be disregarded. (Author)

AD-615 306 Div. 15/1
CFSTI Prices: HC$3.00 MF$0.75

Boeing Scientific Research Labs., Seattle, Wash.
DIFFERENTIAL INEQUALITIES AND ERROR BOUNDS,
by Johann Schroder. Mar 65, 63p
Mathematical note no. MN-401, DI-82-0424
Unclassified report

Also available from the author.

Descriptors: (*Inequalities, Operators (Mathematics)), (*Operators (Mathematics), Inequalities), Differential equations, Boundary value problems, Numerical analysis, Errors.

A unified theory on a certain type of inequalities for abstract linear operators and, in particular, for ordinary linear differential operators of the first, second, and fourth order is developed. The statements which involve these inequalities lead to a principle of error estimation. With a programmed procedure, approximate solutions and corresponding error bounds have been calculated for some examples of the second and fourth order. (Author)

AD-615 313 Div. 15/2, 30/2
CFSTI Prices: HC$1.00 MF$0.50

Naval Research Lab., Washington, D. C.
TESTS ON THE MULTIPLICATIVE CONGRUENCE METHOD OF GENERATING PSEUDO-RANDOM NUMBERS ON THE NAREC COMPUTER.
Final rept.,
by Doris J. Ellis and Peter C. Ryan. 2 Apr 65, 22p
Rept. no. NRL-6217, NAREC-Ref-31
15Proj. RR009 03 45 5802 Unclassified report

Descriptors: (*Pseudo-random systems, Statistical tests), (*Statistical tests, Pseudo-random systems), Sequences, Programming (Computers), Stochastic processes.

This report describes the statistical tests and their results that were made on pseudo-random numbers generated by the 'multiplicative congruential method' on the NAREC computer. The first two million numbers of a particular generated sequence were tested using the frequency test, poker test, serial test, runs above and below the mean test, runs up and down test, and serial correlation test. The purpose of making such tests was to determine if the generated numbers were, in fact, random in their behavior. It was found that these numbers can be considered random for most common applications. (Author)

AD-615 314 Div. 15/2, 20/4
CFSTI Prices: HC$1.00 MF$0.50

Naval Research Lab., Washington, D. C.
STATISTICAL DECOMPOSITION OF A MIXTURE OF TWO GAUSSIAN POPULATIONS,
by H. Bixhorn. 29 Mar 65, 18p
Rept. no. NRL-6226
Proj. RR009 03 45 5802
Unclassified report

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Descriptors: (*Population (Mathematics), Statistical analysis), (*Statistical processes, Population (Mathematics)), (*Helium, Isotopes), Statistical distributions, Probability, Programming (Computers), Harmonic analysis, Integral equations, Numerical methods and procedures.

The problem of decomposing a population that is a mixture of two Gaussian subpopulations is approached by two statistical methods: the method of moments and the method of maximum likelihood. The density function of such a population is given. The problem of decomposing the original population is equivalent to the problem of determining the values of the parameters by which the Gaussian subpopulations are completely determined. The purpose of this report is to obtain estimates of the parameters and to investigate some statistical properties of these estimates. Computer programs which obtain solutions by the method of moments were written and successfully used on the Naval Research Electronic Computer (NAREC). On the other hand, certain difficulties arise in applying the method of maximum likelihood, but studies are in progress to obtain solutions by this method. (Author)

AD-615 325 Div. 15/1, 30/2
CFSTI Prices: HC$1.00 MF$0.50

David Taylor Model Basin, Washington, D. C.
DTMB UNIVAC TRANSPORTATION SIMPLEX.
Research and development rept.,
by Gilbert R. Gray. Nov 58, 25p Rept. no. 1266
Unclassified report

Descriptors: (*Linear programming, Transportation), (*Transportation, Linear programming), Programming (Computers).

This report describes the methods and UNIVAC I routines developed to obtain initial solutions for Suzuki's

Transportation Simplex Method (PB-128 850). The initial solutions considered are the column, row, and matrix minimal (or maximal) and the Northwest Passage solution. At present the m x n cost matrix is limited by m < or = 30 and m + n < or = 719. The starting routines developed serve two main purposes: (1) To obviate tedious hand calculations and data tape preparations, and (2) To reduce the machine time required to solve a complete transportation problem. (Author)

AD-615 350 Div. 15/1

Lincoln Lab., Mass. Inst. of Tech., Lexington.
ON THE SCHWARZ INEQUALITY.
Revised ed.,
by M. J. Levin. 15 Oct 64, 1p
Unclassified report

Pub. in Institute of Electrical and Electronics Engineers. Proceedings (U. S.) v53 n1 p107 Jan 1965. (Copies not available to DDC or Clearinghouse customers).
Supported by ARPA.
Revision of manuscript submitted 24 Sep 64.

Descriptors: (*Inequalities, Theory), Identities, Functional analysis, Geometry.

Since the Schwarz inequality has frequent applications, some closely connected relations may be of interest. The purpose of these relations is to express the ratio of the two sides of the inequality in terms of the integrated squared difference between the two constituent functions, suitably normalized. With the introduction of appropriate factors, the inequality is written as an identity in two different ways and some inequalities of the reverse sense are given.

AD-615 436 Div. 15/1, 18/4
CFSTI Prices: HC$4.00 MF$1.00

RCA Service Co., Inc., Camden, N. J.
VALIDATION OF QUEUING TECHNIQUES FOR DETERMINING SYSTEM MANNING AND RELATED SUPPORT REQUIREMENTS.
Final rept. for Feb-Oct 64,
by R. E. Purvis, W. K. Mallory, and R. L. McLaughlin. Mar 65, 136p
Contract AF33 657 11607, Proj. 1710, Task 171006
AMRL TR-65-32
Unclassified report

Descriptors: (*Queueing theory, Reliability), (*Operations research, Weapon systems), (*Weapon systems, System engineering), Mathematical models, Human engineering, Fire contol systems.

A program was conducted to establish the validity and reliability of a technique of mathematical modeling for predicting manning requirements for weapon systems. The model was based on AMRL-TDR-64-21 (AD-434 803), 'A Queuing Model for Determining System Manning and Related Support Requirements,' and AMRL-TR-64-125, 'Queuing Tables for Determining System Manning and Related Support Requirements.' The technique was applied to two systems; the F105D fire control system (FCS), which presently is operational; and the C141 system, which is scheduled for operation in the near future. The model prediction for the FCS, using field data for parameter estimation, yielded good results when compared with operational performance. Moreover, it was shown that the operational performance could be achieved by 34% less personnel than the manning set by the table of organization. The model prediction for the FCS, using conceptual data, resulted in substantially the same manning for the maintenance shop as that developed from the measured data; but, because maintenance concepts had been changed in the field, the number of flightline airmen was larger than the measured data. The manning prediction for the C141 system, based on operational rates planned for the system and field data on the C130 system, resulted in a prediction of 819 airmen in the organizational maintenance squadron and 476 airmen in field maintenance squadron. (Author)

AD-615 484 Div. 15/2

Engineering Analysis and Special Ammunition Section, Picatinny Arsenal, Dover, N. J.
TABLES OF BINOMIAL EXPANSION FOR STATISTICAL REFERENCE. VOLUME I,
by William Schling and David R. Hyde. Jul 62, 107p Rept. no. EAS-30
Unclassified report

Available only for reference use at DDC Field Services. Copy is not available for public sale.

Descriptors: (*Statistical processes, Tables), (*Tables, Statistical processes), Reliability, Probability, Statistical analysis, Binomials.

The function n(n-1)(n-2)(n-3)....(N=F+1) R to the (n-F) power U to the F power/F(F-1)...1 = 1-C where n = Total number in population, F = Total number of failures, R = Reliability or probability of success, U = 1- R = Unreliability or probability of failure, C = Confidence level, was evaluated to yield values of n for values of R, C and F. (Author)

AD-615 512 Div. 15/1
CFSTI Prices: HC$1.00 MF$0.50

Boeing Scientific Research Labs., Seattle, Wash.
ON NEWTON'S METHOD.
Mathematical Note,
by A. A. Goldstein. Mar 65, 9p
Rept. nos. D1-82-0426, MN-403
Unclassified report

Also available from the author.

Descriptors: (*Iterative methods, Theory), Functional analysis, Operators (Mathematics), Taylor's series, Topology.

In this note we discuss Newton's method in a setting somewhat more restrictive than customary. In this setting, however, we claim to have proved superlinear convergence of the Newton process without assuming twice differentiability or Lipschitz continuity of the first derivative of the operator. A further feature is that the iteration to be discussed is not initially but is eventually the Newton process. With this feature global rather than local convergence is achieved. (Author)

AD-615 513 Div. 15/1
CFSTI Prices: HC$2.00 MF$0.50

Boeing Scientific Research Labs., Seattle, Wash.
ESTIMATIONS IN PARTIAL DIFFERENTIAL EQUATIONS.
Mathematical Note,
by Johann Schroder. Apr 65, 34p
Rept. nos. D1-82-0431, MN-407
Unclassified report

Also available from the author.

Descriptors: (*Partial differential equations, Inequalities), (*Inequalities, Partial differential equations), Nonlinear differential equations, Errors, Boundary value problems, Functional analysis.

A general principle for error estimation is described which can be applied to different types of partial differential equations. Particular attention is paid to nonlinear problems. With a programmed procedure based on this estimation principle, error bounds are calculated for boundary value problems involving the differential equation -deltau + f(x,y,u) = 0. (Author)

AD-615 531 Div. 15/1
CFSTI Prices: HC$3.00 MF$0.75

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
DETERMINATION OF A DIFFERENTIAL EQUATION FROM TWO SPECTRA,
by B. M. Levitan and M. G. Gasymov. 5 May 65, 90p FTD-TT-65-65
TT 65-62298
Unclassified report

Unedited roughdraft trans. of Uspekhi Matematicheskikh Nauk (USSR) v19 n2(116) p3-63 1964.

Descriptors: (*Differential equations, Determination), Real numbers, Sequences, Operators (Mathematics), Boundary value problems, Integral equations, USSR.

AD-615 596 Div. 15/2, 12/1
CFSTI Prices: HC$3.00 MF$0.50

Lockheed Missiles and Space Co., Sunnyvale, Calif.
SPECIFICATION AND MEASUREMENT OF THE RELIABILITY OF PARTS OF GUIDED MISSILES AND SPACE VEHICLES,
by Erich Pieruschka. 1961, 51p Rept. no. LMSC-800920
Unclassified report

Descriptors: (*Statistical processes, Reliability), (*Guided missile components, Reliability), (*Spacecraft, Reliability), Specifications, Statistical distributions.

The study discusses the statistical techniques of measuring high reliabilities; it introduces the quotient of inaccuracy of the measurement of reliability; it investigates the economic and experimental consequences of measuring high reliabilities with an acceptable accuracy; and it discusses the possibilities of meaningful specification for parts of guided missiles and space vehicles. Finally, an upper limit of space vehicle reliability is estimated on the basis of the achieved reliability of intercontinental ballistic missile types. (Author)

AD-615 663 Div. 15/1
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
TRANSVERSALS AND MATROID PARTITION,
by Jack Edmonds and D. R. Fulkerson. May 65, 29p
Rept. no. RM-4608-PR
Contract AF49 638 700
Unclassified report

See also AD-610 556.

Descriptors: (*Combinatorial analysis, Set theory), (*Set theory, Matrix algebra), Linear programming, Algebraic topology, Graphics.

A matroid M = (E, F) is a finite set E of elements and a family F of subsets of E, called independent sets, such that (1) every subset of an independent set is independent, and (2) for every set A belonging to E, all maximal independent subsets of A have the same cardinality, called the rank r(A) of A. The concept of 'matroid' thus generalizes that of 'matrix' or, in particular, that of 'graph.' This paper treats a variety of partition problems involving independent sets of matroids.

AD-615 689 Div. 15/1, 09/1, 25/6

Harvard Univ., Cambridge, Mass.
ON THE EXISTENCE OF ALMOST PERIODIC MOTIONS,
by Lawrence G. Deysach and George R. Sell.
16 Oct 64, 10p
Contract DA31 124AROD128; Grant NSF GP2280
AROD 1617:57
Unclassified report

Pub. in Michigan Mathematical Journal v12 p87-95 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Motion, Differential equations), (*Differential equations, Motion), Theory, Functional analysis, Topology, Mechanics.

In the first part of the paper the authors investigate the question of necessary and sufficient conditions for the existence of (Bohr) almost periodic motions in dynamical systems. The results are applied, in the second part, to give an existence criterion for almost periodic solutions of ordinary differential equations. (Author)

AD-615 744 Div. 15/1, 30/2
CFSTI Prices: HC$3.00 MF$0.75

Mathematics Research Center, Univ. of Wisconsin, Madison.
AN ARSENAL OF ALGOL PROCEDURES FOR THE EVALUATION OF CONTINUED FRACTIONS AND FOR EFFECTING THE EPSILON ALGORITHM,
by P. Wynn. Jan 65, 59p
Technical summary rept. no. MRC-TSR-537
Contract DA11 0220RD2059
Unclassified report

Descriptors: (*Continued fractions, Programming (Computers)), (*Programming languages, Continued fractions), Transformations (Mathematics), Series, Sequences, Special functions (Mathematical).

An integrated system of Algol procedures for the evaluation of continued fractions with real coefficients and for the transformation of slowly convergent sequences by means of the Epsilon-algorithm is given. Use of the procedures is illustrated by the computation of a number of classical functions of Mathematical Physics. (Author)

AD-615 745 Div. 15/1
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
MULTIPLE INTEGRALS INVOLVING PRODUCT OF MODIFIED BESSEL FUNCTIONS OF THE SECOND KIND,
by F. M. Ragab. Feb 65, 20p
Technical summary rept. no. MRC-TSR-541
Contract DA11 0220RD2059 Unclassified report

Descriptors: (*Integrals, Bessel functions), (*Bessel functions, Integrals), Series, Integration, Special functions (Mathematical).

AD-615 746 Div. 15/1
CFSTI Prices: HC$2.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.

AMBIGUOUS POINTS OF ARBITRARY PLANAR SETS AND FUNCTIONS,
by Frederick Bagemihl. Feb 65, 26p
Technical summary rept. no. MRC-TSR-543
Contract DA11 022ORD2059

Unclassified report

Descriptors: (*Set theory, Functions), (*Functions, Set theory), Mathematical logic, Functional analysis, Topology.

13. Mechanical, Industrial, Civil, and Marine Engineering

AD-615 240 Div. 26/5, 12/3
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
WHAT WILL THE MAINTENANCE TOOLS OF ASTRONAUT-MECHANICS BE LIKE.
29 Apr 65, 7p FTD-TT-64-1256
TT 65-62240

Unclassified report

Unedited rough draft trans. of Nauka i Zhizn (USSR) v31 n8 p124-5 1964.

Descriptors: (*Maintenance equipment, Space environmental conditions), (*Space environmental conditions, Maintenance equipment), Pliers, Wrenches, Small tools, Astronautics, USSR.

A short popularized article is presented on special tools for working in a space environment.

AD-615 249 Div. 26/5
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
DEVICE FOR STAMPING OUT PARTS,
by R. V. Pikhtovnikov. 19 Apr 65, 5p
FTD-TT-64-1286
TT 65-62249

Unclassified report

Unedited rough draft trans. of Russian Patent 157958, pub. 22 Jun 49, appl. 369 371/25.

Descriptors: (*Metal forming presses, Explosive forming), (*Explosive forming, Metal forming presses), Patents, Dies, Machine tools, Metals, Sheets, Diaphrams (Mechanics), Rubber, USSR.

The object of the invention is a device for stamping out parts, for example, from sheet metal through shaping by pressure which is produced through an explosion in a hermetically sealed chamber, the pressure being extered on the surface of stock material placed on a die, which is distinguished by the fact that for the purpose of making effice use of the action of the explosive wave the bottom of the chamber is designed in the form of a diaphragm, for example, of rubber between which and the die the stock material to be stamped out is laid.

AD-615 254 Div. 26/5, 14/6
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
DEVICE FOR MANUFACTURING FILAMENT-WOUND CONICAL SHELLS OF IMPREGNATED GLASS,
by E. G. Makharinskii and S. L. Roginskii.
29 Apr 65, 5p FTD-TT-64-1295
TT 65-62254

Unclassified report

Unedited rough draft trans. of Russian Patent 162310, pub. 14 Dec 62, appl. 808107/23-4.

Descriptors: (*Machine tools, Winding), (*Filament wound construction, Winding), (*Glass textiles, Winding), Heat-resistant materials, Binders, Impregnation, Structural shells, Design, Conical bodies, Patents, USSR.

The object of the invention is a device for filament winding of conical shells made of previously impregnated glass materials, which contains a revolving conical mounting, and a movable bobbin holder with a heating roller. For the purpose of preventing the slipping of the wound filament (threads) on the mounting, increasing the productivity, and improving the quality of the article, spring-mounted rollers are set along the periphery of the mounting. The profile of the generatrix of the rollers corresponds to the profile of the conical mounting. The spring-mounted rollers are divided along the axis into freely turning sections.

AD-615 332 Div. 31/5
CFSTI Prices: HC$3.00 MF$0.75

David Taylor Model Basin, Washington, D. C.
STEERING GEAR PERFORMANCE, BACKING AND TRANSIENT TORQUE TRIALS OF USS RIGEL (AF58),
by Quentin R. Robinson. Jan 58, 60p
Rept. no. 1203

Unclassified report

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Descriptors: (*Naval vessels (Support), Maneuverability), (*Marine rudders, Control systems), Performance (Engineering), Torque, Marine surface propulsion, Drive shafts, Experimental data.

As part of the Special Performance Trials of the USS RIGEL (AF58), tests were conducted to collect data on the performance of the ship's steering gear and on the response of the vessel during various types of turning maneuvers. In addition, torque in the main propulsion shafting was measured during acceleration and deceleration runs, high speed turns, and during steady steaming in the ahead and astern directions. The trials were conducted under favorable operating conditions, and the data are considered to be reliable. (Author)

AD-615 333 Div. 31/5, 30/2
CFSTI Prices: HC$1.00 MF$0.50

David Taylor Model Basin, Washington, D. C.
TACTICAL DATA REDUCTION FOR FULL-SCALE SHIP TRIALS,
by H. Polachek and W. Mann. Aug 58, 20p
Rept. no. 1261

Unclassified report

Descriptors: (*Ships, Maneuverability), Least squares method, Programming (Computers), Data, Reduction.

A practical procedure is derived for calculating the tactical diameter and related ship maneuverability characteristics, on the basis of the method of least squares, from data obtained at full-scale ship trials. The calculating procedure was programmed for solution on the UNIVAC facility at the Applied Mathematics Laboratory. (Author)

AD-615 338 Div. 26/8, 07/5
CFSTI Prices: HC$2.00 MF$0.50

Naval Ordnance Test Station, China Lake, Calif.

LINEAR ANALYSIS OF A DIGITAL HYDRAULIC SERVO SYSTEM WITH A RESONANT LOAD.
Rept. for Oct-Dec 64,
by T. W. Nickell. Mar 65, 51p
Rept. no. NOTS TP-3777
Task RMWC21 113 216 1F009 04 04
Unclassified report

Descriptors: (*Mathematical models, Hydraulic servomechanisms), (*Hydraulic servomechanisms, Digital systems), Actuators, Resonance, Integral transforms, Control systems.

A resonant-loading term was added to the linear mathematical model of the digital hydraulic servo system described in NOTS TP 3602, and an analysis was conducted to determine its effect on the response of the system. This report, which outlines the analytical methods used and gives the results of the analysis, also includes excerpts from (Linear Analysis of a Hybrid Responder System, NOTS TP 3602.) (Author)

AD-615 451 Div. 26/1, 14/8
CFSTI Prices: HC$1.00 MF$0.50

Pacific Missile Range, Point Magu, Calif.
LOW-COST PLASTIC FOAM MOLDS FOR LAMINATED PLASTICS,
by D. M. Russell. 24 May 65, 8p
Technical note no. PMR-TN-65-1
Unclassified report

Descriptors: (*Molding, Expanded plastics), (*Laminated plastics, Molding), Costs, Epoxy plastics, Polyester plastics, Reinforcing materials, Glass textiles, Density.

Low-cost rigid plastic foam molds are used at the Pacific Missile Range for prototype or minimum-production runs of radomes, nose cones, spheres, cylinders, etc., that are to be made of glass-reinforced epoxy or polyesterwhere the hand-layup or vacuum-bag method is used. The method used in fabricating rigid plastic foam molds is presented, but is intended as a guide only. Fabrication of rigid plastic foam molds suitable for prototype and limited production of laminated plastic objects is simple and economical. The equipment required for fabrication does not exceed that normally used in fabricating wooden or plaster molds. The plastic molds are light and are therefore easy to handle. Longer runs may be possible by using high density foam for the molds. The foam used at PMR had a density of 2 pounds per cubic foot, but it is available in densities up to 44 pounds per cubic foot. (Author)

AD-615 480 Div. 31/4, 25/6
CFSTI Prices: HC$3.00 MF$0.75

Allied Research Associates, Inc., Concord, Mass.
STRESSES IN REINFORCED, PERFORATED, RECTANGULAR PLATES LOADED BY TRANSVERSE PRESSURE.
Final rept.,
by Ralph Papirno and Herbert Becker. Dec 64,
78p ARA-F-239-4
Contract Nobs88508
Unclassified report

Descriptors: (*Metal plates, Stresses), (*Bulkheads, Submarine hulls), Mathematical analysis, Loading (Mechanics), Pressure, Deformation, Photoelasticity, Penetration, Reinforcing materials, Rectangular bodies, Orifices, Structural properties.

A combined theoretical and photoelastic investigation was conducted to develop optimum reinforcements for penetrations in submarine pressure bulkheads. Experimental results obtained on unreinforced holes in plates under biaxial bending showed good correlation with existing data for uniaxial bending from which stresses are determinable for any biaxial bending moment ratio. In addition, stresses were determined for various biaxial bending ratios on plates with apertures reinforced according to a procedure currently in use by the U. S. Navy Department. In order to acquire this information it was necessary to develop a new photoelastic technique which is described in detail. This procedure was used successfully at room temperature to examine reinforcements on moment loaded plates. Problems arose in the application of the technique to pressure loaded plates. Therefore, stress freezing was employed for these studies. However, the large deflections induced during these latter studies raised questions as to the accuracy of the data. As a consequence, further investigation appears indicated before design optimization procedures are achievable. This report contains complete details of the investigation together with recommendations for an approach which should yield reliable data for designing optimum reinforcements at apertures in pressurized bulkheads. (Author)

AD-615 509 Div. 26/1
CFSTI Prices: HC$1.00 MF$0.50

Naval Ordnance Test Station, China Lake, Calif.
THE APPLICATION OF ULTRASONICS TO WIRE DRAWING.
Quarterly progress rept. no. 2, 1 Oct-31 Dec 64,
by A. T. Robinson, J. C. Connelly, and L. M. Stayton. Mar 65, 9p
Technical progress rept. no. TPR-390, NOTS-TP-3768
Task RRMA24 063 216 1R007 06 01
Unclassified report

See also AD-610 058.

Descriptors: (*Drawing (Machine processing), Ultrasonic radiation), (*Ultrasonic radiation, Drawing (Machine processing)), (*Wire, Drawing (Machine processing)), Hardness, Tensile properties, Titanium, Copper, Iron, Machine tools, Deformation, Dies, Temperature.

Hardness and tensile strength measurements were performed on titanium, copper and iron wire drawn with and without ultrasonic radiation. The results show that less work-hardening was induced during deformation when radiation was present. Temperature measurements made at the die bearing surface disclosed only a minor temperature rise for a given set of conditions. The continuous drawing equipment has been placed in operation and performs satisfactorily.

AD-615 510 Div. 11/12

Army Engineer Waterways Experiment Station, Vicksburg, Miss.
DEFLECTION OF MOVING TIRES. CENTER-LINE DEFLECTION STUDIES THROUGH JULY 1963,
by M. E. Smith and D. R. Freitag. May 65, 44p
Technical rept. no. TR-3-516, R-3
Proj. 1V0 21701A046, Task 1V0 21701A04603
Unclassified report

Available from Waterways Experiment Station, Vicksburg, Miss., $0.75.

Descriptors: (*Tires, Deflection), (*Sand, Tires), Inflatable structures, Pressure, Loading (Mechanics), Soils, Tests, Test equipment, Vehicle wheels.

Tire deflection data were studied from 30 tests performed in the single-wheel test facilities with pneumatic tires at various inflation pressures operating in Yuma desert sand and mortar sand of various strengths. Plots are presented of a path of points on the center line of the tires relative to a moving and a fixed frame of reference. Representative plots are included to show the effect of slip, soil strength, and inflation pressure on the path and to compare the paths of a point on the towed and powered tire. (Author)

AD-615 520 Div. 13/4, 13/6
CFSTI Prices: HC$1.00 MF$0.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
PIONEER POLAR STRUCTURES, JAMESWAY BUILDING DIVIDER.
Rept. for Jul 64-Mar 65,
by G. E. Sherwood. May 65, 15p
Technical rept. R-383,
Proj. YF015 11 01 105

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Structures, Polar regions), (*Buildings, Panels (Structural), (*Military facilities, Polarregions), Prefabricated buildings, Separation, Shelters, Design, Installation, Plywood, Military requirements, Specifications.

A building divider was developed for the Jamesway polar shelter to separate two facilities located in the same building. The divider is constructed of tongue-and-groove panels of wood framing and plywood. It can be placed across the building width under any arch rib. The panels are insulated for soundproofing. A door included with the divider can be placed in any of three positions. The divider was in-service tested at the NCEL experimental camp near McMurdo, Antarctica. It was concluded that it satisfies the requirements for separating spaces in a Jamesway and should be used as a standard accessory for the Jamesway. (Author)

AD-615 521 Div. 13/4, 14/6
CFSTI Prices: HC$2.25 MF$0.75

Naval Civil Engineering Lab., Port Hueneme, Calif.
STUDY OF CREEP IN CONCRETE, PHASES 3, 4, AND 5.
Final phases for Jun 61-Jun 64,
by John R. Keeton. May 65, 87p
Technical rept. no. R-333-111
Proj. YR007 05 01 011

Unclassified report

See also AD-611 138.

Descriptors: (*Concrete, Creep), (*Creep, Concrete), (*Beams (Structural), Concrete), Civil engineering, Stresses, Strain (Mechanics), Loading (Mechanics), Deformation, Measurement, Tests, Box beams, Cylindrical bodies, Aging (Materials), Photoelasticity, Coatings.

Texts were made on small, rectangular, prestressed concrete beams to determine prestressing losses. It was found that data from these tests could be used to predict prestressing losses in full-sized beams. Cylindrical concrete specimens were steam cured and subjected to long-time compressive loading. It was found that creep and shrinkage was 25 to 46% less than that of normally cured concrete. It was learned that time-dependent strains in concrete speciments are equal, whether they are measured end-to-end or in the central portion of the specimen. Also, results indicate that shrinkage is equal whether measured on the surface or on the inside of specimens. Shrinkage is affected by the size and shape of specimens, and loaded and non-loaded concrete cylinders lose about the same weight of water when subjected to the same storage conditions. Photoelastic coatings on concrete specimens revealed that time-dependent strain distribution is non-uniform and that large pieces of aggregate may contribute to this non-uniformity, although they are not strain centers themselves. (Author)

AD-615 536 Div. 26/1
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
AUTOMATIC WELDING (SELECTED ARTICLES),
by V. T. Slepukha and G. K. Kharchenko. 14 May 65, 24p FTD-MT-65-63
TT 65-62303

Unclassified report

Edited machine trans. of Avtomaticheskaya Svarka (USSR) v18 n2 p23-33 1965.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Diffusion bonding, Scientific research), Carbon dioxide, Joints, Welding, Casting, Steel, Iron, Materials, Vacuum apparatus, Mechanical properties, USSR, Controlled atmospheres.

The possibility is considered of replacement, in certain cases, of the vacuum by a readily-available gas medium. Welding conditions and mechanical properties of the joint are given. The peculiarities of diffusion bonding of uniform and heterogeneous materials are considered, and industrial application of this method of welding and utilized equipment are described. (Author)

AD-615 563 Div. 13/4
CFSTI Prices: HC$3.00 MF$0.75

Brown Univ., Providence, R. I.
ON THE MEANING OF CONCENTRATED LOAD SOLUTIONS IN THE PLASTIC THEORY OF STRUCTURES,
by Charles A. Anderson and Richard T. Shield.
Mar 65, 86p Technical rept. no. TR-42
Contract Nonr56220, Proj. NR064 424

Unclassified report

Descriptors: (*Structures, Loading (Mechanics)), (*Plasticity, Structural parts), (*Structural shells, Loading (Mechanics)), (*Beams (Structural), Loading (Mechanics)), Deformation, Failure (Mechanics), Cylindrical bodies, Rectangular bodies, Mathematical analysis, Theory, Distribution, Tensile properties, Shear stresses.

The report investigates the significance of structural theory solutions for structures composed of perfectly-plastic materials when the loading is of a highly localized nature. Limit analysis is applied to illustrative problems involving structures elements of typical dimensions in order to compare the actual collapse loads with those provided by the structural theory. For strip loading of a rectangular beam or circular cylindrical shell it is found that as the width of the loaded region decreases the transition from the type of failure predicted by this

structural theory to failure due to local plastic flow is very abrupt, and the structural theory is accurate even for strip widths which are small compared to the thickness of the beam or shell. For a circular plate under a central disc of pressure the results obtained indicate that the transition from the collapse mechanism predicted by the plate theory to local plastic flow involves intermediate mechanisms with appreciable transverse shear resultants, and for plate theory to apply the diameter of the disc must be greater than the plate thickness. (Author)

AD-615 603 Div. 31/4
CFSTI Prices: HC$3.00 MF$0.75

David Taylor Model Basin, Washington, D. C.
ANALYSIS OF STRESSES IN THE VICINITY OF A TEMPORARY SHIPPING HATCH IN A STIFFENED CYLINDRICAL SHELL,
by C. D. Bond. Apr 65, 57p Rept. no. 1949
Proj. S F013 03 02, Task 1955
Unclassified report

Descriptors: (*Stresses, Stiffened cylinders), (*Hatches, Submarine hulls), Fatigue (Mechanics), Structural shells, Steel, Welding, Strain gages, Submarine models.

A shipping hatch was removed from an 0.8-scale submarine fatigue model by torch cutting. It was then welded back into place and once again removed. Surface strains were measured at numerous locations in the hatch area during the entire operation. Test results indicate that stress changes from the virgin model to the hatch welded in place are moderate 12 in. or more away from the weld but are very high near the weld, in some areas as high as the specified yield strength. Further, weld-induced bending stresses follow logically from the manner of dogging the hatch in place and direct stresses seem to follow a pattern which should be predictable after conclusive investigations of weld-induced stresses in HY-80 steel have been initiated and completed. Stress results were supplemented by removing a similar hatch from a 1/3-scale submarine fatigue model of the same configuration. Related tests presented in the Appendixes show that torch cutting apparently induces compressive surface stresses near the cut and that the weldable strain gages employed are relatively inaccurate. (Author)

AD-615 629 Div. 26/1, 27/3
CFSTI Prices: HC$1.00 MF$0.50

Arde-Portland, Inc., Paramus, N. J.
INVESTIGATION AND OPTIMIZATION OF HIGH STRENGTH ALLOYS FOR CRYOGENIC STRETCH-FORMING.
Quarterly technical rept. no. 1, 1 Jan-31 Mar 65,
by Roger McDonough. 31 Mar 65, 16p
Contract NOw65 0193f
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Stretch forming, Cryogenics), (*Alloys, Rocket components), Aluminum alloys, Niobium alloys, Cobalt alloys, Molybdenum alloys, Toughness, Fracture (Mechanics), Rocket motors, Pressure vessels, Optimization, Test methods, Heat.

Several specimens of commercially available 301 were cryogenically stretched, fatigue cracked, and tested, in order to establish proper test procedures. This heat was shown to be very tough, with notch ratios close to 1. Uniaxial specimens were then fabricated from nine residual heats of material. The specimens from two heats were cryogenically prestrained, fatigue cracked, aged, and tested. A set of four heats of material was ordered. This initial procurement was for two straight 301 heats, and two Co-Mo heats. The biaxial test fixture design was completed and reviewed. (Author)

AD-615 634 Div. 13/11, 18/1
CFSTI Prices: HC$2.00 MF$0.50

HRB-Singer, Inc., State College, Pa.
PRE-PROTOTYPE HAND-HELD FIRE DETECTORS.
Final rept. for 30 Sep 64-26 Apr 65,
by C. Bastuscheck. 15 Mar 65, 31p
Rept. no. 76711-F
Contract OCD PS65 11
Unclassified report

Descriptors: (*Civil defense systems, Fire safety), (*Fire safety, Civil defense systems), (*Fire alarm systems, Infrared equipment), Fires, Nuclear warfare, Nuclear explosions, Civil defense personnel, Civilian personnel, Fire extinguishers, Buildings, Urban areas, Performance (Engineering), Design, Sprays, Tests.

It was determined that in an urban area exposed to a nuclear burst, the suppression of the large number of fires which will occur must necessarily include efforts of untrained personnel (self-help), and trained civilian brigades in addition to public fire departments. The effectiveness of personnel and the amount of water required to suppress fires on the level of self-help and brigades were determined from experiments performed in laboratory and in actual structures. Experiments consisted of suppression of furniture fires during various stages of developments. It was found that up to about two minutes prior to the flashover, fires can be controlled by the use of hand extinguishers, corresponding to the self-help effort. The effectiveness of the self-help efforts is given as a function of fire duration. It was determined that brigades can suppress single and two adjacent rooms flashover fires with single booster line spray streams using about 15 to 48 gallons of water, respectively. Fire Department operations were analyzed using data gathered on certain selected actual building fires. In general, rural and small urban fire departments were found to be using considerably less water than large urban area fire departments. Criteria are given for the number of self-help and brigade teams required to suppress a given number of fires initiated by the thermal pulse. Various aspects of fire department operational needs are discussed. (Author)

AD-615 649 Div. 26/4

American Society for Quality Control, Inc., Milwaukee, Wis.
ANNUAL TECHNICAL CONFERENCE(19th). TRANSACTIONS, MAY 3, 4, 5, 1965 LOS ANGELES, CALIFORNIA. 1965, 736p
Unclassified report

Available from A. S. Q. C. 161 West Wisconsin Avenue, Milwaukee, Wis. 53203, $6.00.

Descriptors: (*Quality control, Symposia), Statistical processes, Reports, Production.

AD-615 735 Div. 26/1, 17/6
CFSTI Prices: HC$2.00 MF$0.50

Frankford Arsenal, Philadelphia, Pa. Research and Development Directorate.
WELDING 2014-T6 and 2024-T86 ALUMINUM ALLOY SHEET,
by David E. Schillinger. Mar 65, 46p
Rept. no. R-1752
Proj. 1A0 24401A111

Unclassified report

Descriptors: (*Welding, Aluminum alloys), (*Aluminum alloys, Sheets), (*Sheets, Welding), Mechanical properties, Aging (Materials), Welds, Tensile properties, Stresses, Welds.

The objective of the work was to improve the mechanical properties of 2000 series aluminum alloy weldments. Major efforts were directed toward obtaining increased quenching rates and solidification rates in the weld beads and heat-affected zones, and minimization of heat-affected zone width. These effects were sought by preparing welds with minimum practicable energy inputs and, also, by precooling the materials to be welded to extreme subzero temperatures (-250F). The effects of weld bead removal and post-weld natural and artificial aging were also evaluated. Evaluation of the weldments was based primarily on the results of tensile and bulge tests. It was found that high joint efficiencies (about 90 percent) could be obtained in 2014-T6/4145 (base metal/filler metal) and 2024-T86/4145 weldments with minimal energy inputs, both with or without the use of coolants. Bead (reinforcement) removal had unfavorable effects on the mechanical properties of weldments. Artificial aging improved tensile, yield, and bulge strengths of weldments. There were slight losses in ductility of some portions of the weld composite, however, when artificial aging was performed. (Author)

AD-615 736 Div. 13/4
CFSTI Prices: HC$1.00 MF$0.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
ICE BRIDGE ANALYSIS,
by Donald E. Nevel. Apr 65, 13p
Research rept. no. RR-148
Task 1V025001A13001

Unclassified report

Descriptors: (*Ice, Mechanical properties), (*Bridges, Ice), Construction, Rivers, Freezing, Mathematical analysis, Integral transforms.

A technique for strengthening of the ice on naturally frozen rivers is to successively flood and freeze within a confined width, creating a much thicker 'ice bridge.' An exact analysis is made of the elastic deformation and the moments in the bridge for arbitrarily placed, concentrated and distributed loads. The results are given in terms of infinite convergent series, which may easily be evaluated numerically. For the case of the infinitely wide river, the solutions become integrals. (Author)

AD-615 737 Div. 13/4, 18/1
CFSTI Prices: HC$4.00 MF$0.75

Defense Atomic Support Agency, Albuquerque, N. Mex.
EVALUATION OF BURIED CORRUGATED-STEEL ARCH STRUCTURES AND ASSOCIATED COMPONENTS,
by G. H. Albright, E. J. Beck, J. C. LeDoux, and R. A. Mitchell. 28 Feb 61, 106p
Proj. 3 3
WT 1422; PB 159 772

Unclassified report

Rept. on Operation PLUMBBOB, Nevada Test Site, May-Oct 57.

Descriptors: (*Shelters, Structural properties), (*Underground structures, Structural properties), Structural shells, Structural parts, Steel, Valves, Power equipment, Generators, Shielding, Radiation measurement systems, Foundations, Ventilation, Blast, Thermal radiation.

Three underground corrugated-steel arch structures covered with 5 feet of earth were subjected to peak overpressures of 60 and 100 psi during Shot Priscilla at the Nevada Test Site. Essentially, it was desired to assure that Department of Defense Class II (50-psi overpressure and comparable radiations) protection is afforded by two types of 25-foot diameter, 180-degree corrugated-metal arches. Free-field overpressure was measured at the ground surface above the structures, along with pressure inside each structure, acceleration of the floor slab, arch deflection relative to the floor slab, and gamma and neutron radiation dose inside each structure. Dust was measured inside one structure. All arch structures provided adequate Class II protection for the conditions of the test. One arch structure, reinforced with steel arch ribs, withstood 100-psi overpressure (333-msec positive-phase duration) with no significant damage other than a cracked floor slab. A blast closure valve was tested in the ventilating system of one structure. Operation was satisfactory during the positive-pressure phase, but the valve leaked excessively during the negative-pressure phase. Prototype pits designed to partially shield emergency power generator sets against blast, missiles, and thermal radiation damage were tested to determine their adequacy. Damage assessment indicated significant but inadequate protection at the overpressures to which the generator sets were exposed. (Author)

14. Methods and Equipment

AD-615 214 Div. 24/2, 20/6
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PHOTOGRAPHIC PROPERTIES; STORAGE LIFE; AND PROCESSING OF EMULSION LAYERS OF NIKFI TYPE R (USUAL AND WITH GELATINS SUBSTITUTES)
by M. Yu. Deberdeev, T. I. Krestovnikova, K. M. Romanovskaya, and V. M. Uvarova. 5 Apr 65, 21p FTD-MT-64-555
TT 65-62214

Unclassified report

Edited machine trans. of mono. Yadernaya Fotografiya (Nuclear Photography) Moscow, 1960 p199-209.

Descriptors: (*Photographic emulsions, Physical properties), Storage, Sensitivity, Stability, Photographic images, Temperature, Humidity, Adhesion, Processing, Photographic chemicals, pH, Photographic grain, Photographic fog, Charged particles, USSR.

Topics include: Photographic sensitivity, stability of photographic properties and latent image, and influence of temperature and humidity on the photographic stability of unbacked NIKFI type R emulsions; adhesion of type R emulsions on glass; influence of degree of tanning, pH of developer, and duration of processing of glass-backed type R emulsions, with and without gelatin substitutes.

AD-615 222 Div. 24/2, 12/6
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
INCREASE IN THE SENSITIVITY OF PHOTOGRAPHIC MATERIALS WITH THE AID OF SUPPLEMENTARY LIGHT INTENSIFICATION IN THE PHOTOGRAPHING OF ARTIFICIAL SATELLITES OF THE EARTH,
by I. I. Breido, A. A. Markelova, and G. A. Firago. 16 Apr 65, 20p FTD-TT-64-1156
TT 65-62222

Unclassified report

Unedited rough draft trans. of Glavnaya Astronomicheskaya Observatoriya, Pulkovo. Izvestiya (USSR) v23 n2 p167-74 1963.

Descriptors: (*Space surveillance systems, Photographic materials), (*Photographic materials, Sensitivity), (*Satellites (Artificial), Photography), Photographic images, Intensity, Photographic film, Photographic techniques, Photographic contrast, USSR.

It was found that uniform intensity gating of photographic negatives by weak diffused light for 3 to 5 minutes leads to a noticeable increase in the photographic effect, if the exposure was of the order of 0.05-0.01 sec. The effectiveness of the latensification of the image by intensity gating is great in those cases where the photographic materials are developed not to the maximum contrast. However, in the case of observation of artificial satellites of the earth, where the photographic materials were developed almost to maximum contrast, the gain in sensitivity amounts to about 60-80%. The corresponding increase in the limiting stellar magnitude of the observed satellite by magnitudes of 0.5-0.6, has great significance in many cases, since the intensity of the background produced by intensity gating should not go above 0.1, and the coefficient of contrast is hardly reduced. (Author)

AD-615 239 Div. 30/5, 02/1, 02/2, 24/2
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ASTROMETRICAL MEASUREMENTS OF MOON PHOTOGRAPHS WITH A PHOTOELECTRIC DEVICE,
by N. G. Bystrov. 26 Apr 65, 9p FTD-TT-64-1248
TT 65-62239

Unclassified report

Unedited rough draft trans. of mono. Astrometricheskaya Konferentsiya SSSR (no. 15) Pulkovo, 1960. Trudy 1963 p403-6.

Descriptors: (*Photographic plates, Calibration), (*Photomultipliers, Calibration), (*Moon, Mapping), Photointerpretation, Surface properties.

The scheme of an automatic photoelectric measuring device for measurements of points of the lunar limb is given. A comparison is made of the precision of visual and photoelectric measurements of the lunar limb, to be used for the determination of the coordinates of the moon's center and the study of the irregularities of the limb. (Author)

AD-615 251 Div. 30/3
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
MAGNETIC COMPENSATING AMMETER,
by T. A. Grivinsh. 24 Apr 65, 5p FTD-TT-64-1292
TT 65-62251

Unclassified report

Unedited rough draft trans. of Russian Patent 160225, pub. 28 Jun 62, appl. 784454/26-10.

Descriptors: (*Ammeters, Design), Measureing devices (Electrical and electronic), Magnetic fields, Ferromagnetic materials, Magnetic cores, Patents, USSR.

AD-615 292 Div. 30/3, 26/4
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
METHOD OF PREVENTING INCORRECT INDICATIONS IN AN AUTOMATIC ULTRASONIC FLAW DETECTOR,
by Yu M. Rapoport. 28 Apr 65, 5p FTD-TT-64-1280
TT 65-62265

Unclassified report

Unedited rough draft trans. of Russian Patent 154699, pub. 14 Dec 61, appl. 755822/25-8.

Descriptors: (*Ultrasonic radiation, Non-destructive testing), (*Monitors, Quality control), (*Quality control, Reliability), Non-destructive testing, Errors, Countermeasures, Corrections, Resonance, Frequency, Piezoelectric effect, Instrumentation, Materials, Automatic, Patents, USSR.

The object of the invention is a method of preventing incorrect indication in an automatic ultrasonic flaw detector which is distinguished by the fact that the resonance frequencies of the converters of the neighboring channels are displaced with reference to each other. (Author)

AD-615 300 Div. 30/3, 25/6
CFSTI Prices: HC$2.00 MF$0.50

Harry Diamond Labs., Washington, D. C.
TUNNELING JUNCTION DIODE PRESSURE GAUGE.
Summary rept.,
by Marvin M. Cohen and Leon Horn. 5 Mar 65, 26p
Rept. no. TR-1282
Projs. 30300, 1P010501A008

Unclassified report

Descriptors: (*Pressure gages, Tunnel diodes), (*Tunnel diodes, Pressure gages), Germanium, Arsenic, Impurities, Transducers, Digital systems, Oscillators, Diodes (Semiconductors).

Tunneling junction diodes, designed specifically for use as miniature pressure gauges, were fabricated from arsenic-doped germanium of resistivity 0.001 ohm-cm and tested under hydrostatic pressures up to 10,000 psi. These 'flat ' diodes differ from ordinary tunnel diodes in that the peak-to-valley ratio has been reduced to 1 or less by increasing the excess and diffusion currents with high temperature alloying and increased alloying times. A negative resistance region appears only at low temperatures. This type of flat-characteristic, two-terminal device is useful as a constant-current device when the peak-to-valley ratio is 1 and as a variable range pressure gauge when the peak-to-valley ratio, is 1 or less by utilizing the pressure dependence of the tunneling current. These diodes have the advantage that they need not satisfy the strict stability requirements of the amplifier mode as does the usual tunnel diode when it is used in this manner; furthermore, bulky low inductance mounting is no longer needed. It is now possible to take full advantage of the extremely small size of these diodes, the working area of which may be as small as 0.003 in. in diameter. Gauge factors of 350 were achieved and the change in 'peak' current with pressure was shown to be comparable with that of Esaki diodes. Preliminary results are shown for a digital readout pressure transducer working from a tunnel diode oscillator. (Author)

AD-615 336 Div. 24/1, 02/1

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
NEW FAST CAMERA WITH SPHERICAL OPTICS,
by G. M. Popov. 17 Apr 65, 15p FTD-MT-63-354
TT 65-62277

Unclassified report

Edited machine trans. of Akademiya Nauk SSSR. Krymskaya Astrofizicheskaya Observatoriya. Izvestiya, v27 p309-17 1962.
Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*High-speed cameras, Astronomical cameras), (*Astronomical cameras, Wide-field cameras), Spectrographic cameras, Camera lenses, Refractive index, Meteors, Nebulae, Zodiacal light.

A fast camera of comparatively simple design, with a large field and slight losses and scattering to light is described. Formulas are given for computing the aberration of the system. Different modifications of the system (achromatic and plane field) are considered. Results of computation of 15 different schemes with different focal ratios and refractive indices are tabulated. The system can be used for the study of meteors, nebulae, zodiacal light, air-glow, etc. It can also be used as a camera of a spectrograph. (Author)

AD-615 346 Div. 30/5
CFSTI Prices: HC$3.00 MF$0.75

Army Materials Research Agency, Watertown, Mass.
A REPORT GUIDE TO LITERATURE IN THE FIELD OF ELECTROMAGNETIC TESTING.
Monograph series,
by Robert C. Grubinskas and Charles P. Merhib.
Apr 65, 94p AMRA MS-65-03

Unclassified report

Descriptors: (*Non-destructive testing, Bibliographies), (*Bibliographies, Non-destructive testing), (*Test methods, Electromagnetic fields), Abstracting, Indexes, Quality control, Materials, Reports, Test equipment, Metals.

The compilation provides simple and fast access to information on the subject of electromagnetic testing and yet provide sufficient information in the form of abstracts and word descriptors to make the listing useful. This guide consists of a bibliography of items currently in the AMRA Nondestructive Testing Information Retrieval System covering the subject of electromagnetic testing.

AD-615 366 Div. 30/4, 20/7
CFSTI Prices: HC$2.75 MF$1.00

Naval Research Lab., Washington, D. C.
THE DESIGN, CONSTRUCTION, AND EQUIPMENT OF A NEW HIGH LEVEL RADIATION LABORATORY AT NRL.
Final rept.,
by E. J. Chapin. 14 Apr 65, 131p Rept. no. NRL-6205

Unclassified report

Descriptors: (*Naval research laboratories, Design), (*Radiochemistry laboratories, Laboratory equipment), Shielding, Construction, Gamma rays, X rays, Decontamination, Radioactivity, Radioactive waste, Disposal, Isotopes, Storage, Ventilation, Tests.

A new NRL High Level Radiation Laboratory is described, with special emphasis on the design, construction, and collateral equipment. This laboratory provides a means for safely handling and conducting research on gamma-active materials of interest to the Navy. The facility includes: five hot cells, with three designed for 1,000 curies and two designed for 10,000 curies of 1-Mev gamma; isolation cubicles back of cells; a 'warm' work area; a decontamination room; x-ray laboratory; radiochemistry laboratory; machine shop; isotope storage facilities; waste disposal system; 'cold' laboratories; and offices and utilities area. Design innovations discussed include: steel-lined cells; all-glass windows with exceptional viewing angle and clarity; manually operated hinged steel shielding doors; internal and external transfer drawers; special receptacle panels in cells; cell lighting; underwall U-tubes; under-window access ports; removable roof plugs; isotope storage; waste disposal system; and gas scrubber. Equipment discussed includes: heavy-duty master-slave manipulators; mechanical arm manipulators and bridge cranes in cells; through-the-wall periscope; through-the-wall stereomicroscope; a remotely controlled shielded metallograph with through-the-wall specimen transporter; and metallographic specimen preparation equipment. Results of tests with a 9,500-curie Co-60 source on the shielding integrity of the facility are presented. (Author)

AD-615 394 Div. 18/3, 26/2, 32/4
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
SOME COMMENTS ON COST-EFFECTIVENESS,
by E. S. Quade. Mar 65, 16p Rept. no. P-3091
Unclassified report

Rept. prepared for presentation as part of a panel on 'Cost/Effectiveness' at the U. S. Army Operations Research Symposium (4th), Redstone Arsenal, Ala., 31 Mar 65.

Descriptors: (*Systems engineering, Defense systems), (*Management planning, Defense systems), (*Defense systems, Costs), Armed forces budgets, Armed forces procurement, Procurement, Decision making, Mathematical models.

Contents:
Distinction between systems analysis and cost effectiveness
Limitations of analyses in defense planning
Pitfalls of analyses in defense planning
The 'cherished belief' leading to an 'attention bias', the most frequent cause of failure to look at a full range of alternatives
Transferring a portion of an administrator's decision making function to a model
Current status of systems analysis
Advantages of systems analysis.

AD-615 401 Div. 18/3, 26/2
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
A NEW COST MODEL TO SUPPORT AIR FORCE LONG-RANGE PLANNING,
by B. D. Bradley, R. E. Clapp, and R. L. Petruschell. May 65, 22p Rept. no. P-3133
Unclassified report

For presentation by R. L. Petruschell at the Dept. of Defense Logistics Research Conference, Airlie Inst., Warrenton, Va., 26-28 May 65.

Descriptors: (*Air force procurement, Costs), (*Air force budgets, Mathematical models), (*Costs, Mathematical models), Management planning, Defense systems, Air force equipment, Logistics, Strategic Air Command.

This paper describes the objectives, concepts, and structure of a new Air Force force structure cost analysis model currently being developed by RAND. To provide a setting for the new model, this paper describes the nature of the long-range planning process, the role of cost analysis, and some general characteristics of modeling. The concepts underlying the model and their application in the analysis process are also discussed. Among these are the concepts of alternative planning end products (including support activities), fixed and variable resources and costs, incremental resources and costs, identification of investment (one time) and operating (recurring) costs and the use of generalized estimating relationships. The selection of an appropriate cost element and program element (end product) structure, the framework of the model, is a critical step. Considerable attention is given to the description and rationale of the proposed framework, particularly the use of organizations as key building blocks. The paper also discusses how the framework will be used to guide the research for the model and ultimately serve as the primary output format.

AD-615 402 Div. 30/3, 26/4
CFSTI Prices: HC$1.00 MF$0.50

Army Materials Research Agency, Watertown, Mass.
PROPOSED NEW PENETRAMETER DESIGNS WHICH PROVIDE FOR ALL NECESSARY RADIOGRAPHIC QUALITY LEVELS,
Monograph series,
by Ernest H. Rodgers. May 65, 11p AMRA MS-65-02
Unclassified report

Descriptors: (*Test equipment, Radiography), (*Radiography, Test equipment), (*Meters, Pentration), Thickness, Quality control, Sensitivity, Design.

Penetrameter designs are described which provide for quality levels of 1-1T, 1-2T, 2-1T, 2-2T, 2-4T, and 4-2T for materials thicknesses up to 3.0 inches; 1-1T, 1-2T, 2-1T, 2-2T, and 2-4T for material thicknesses of 3.0 to 9.0 inches; and 1-1T, 1-2T, 2-1T, and 2-2T for material thicknesses over 9.0 inches.

AD-615 431 Div. 30/3, 25/8
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PECULIARITIES OF THE MEASUREMENTS OF TEMPERATURE UNDER CONDITIONS OF ALTERNATING HEAT EMISSIONS,
by A. N. Gordov. 5 Apr 65, 13p FTD-TT-64-1076
TT 65-62287
Unclassified report

Unedited rough draft trans. of Izmeritelnaya Tekhnika (USSR) n5 p29-32 1957.

Descriptors: (*Thermometers, Heat transfer), (*Thermal radiation, Thermometers), Thermocouples, Resistance thermometers, Thermal conductivity, Thermodynamics.

The peculiarities of the changes in the temperature of a body as a result of its heat exchange with the surrounding medium are studied. These studies are applied to determination of the dependability of measurements of the temperature of fluids by immersion temperature pickups.

AD-615 445 Div. 30/5, 24/2, 25/6
CFSTI Prices: HC$2.00 MF$0.50

New York Univ., N. Y. School of Engineering and Science.
RESEARCH ON KINETICS OF DEFORMATION AND FRACTURE.
Final rept. for Apr 59-Jun 64,
by H. Ezrol and H. Margolin. Jan 65, 45p
Contract AF33 616 6430, Proj. 7021, Task 702105
ARL 65-21
Unclassified report

Descriptors: (*High-speed cameras, Fracture (Mechanics)), (*Metals, Fracture (Mechanics)), (*Fracture (Mechanics), High-speed photography), Kinetics, Deformation, Zinc, Test equipment.

A high speed electronic photographic device, an image convertor, was constructed to record the kinetics of fracture in metal samples. The image convertor is capable of photographing at a framing rate as rapid as 2 million frames per second with as short an exposure time as 0.1 microseconds. Also assembled and constructed were an impact tensile apparatus, a high intensity light source, and a complex of electronic synchronizing mechanisms. The image convertor and its accompanying equipment have been successfully synchronized. Photographs of cracks passing through polycrystalline zinc samples were obtained. (Author)

AD-615 461 Div. 30/3, 30/5
CFSTI Prices: HC$3.00 MF$0.75

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
AN EVAPORATIVE FILM CALORIMETRIC ENTHALPY PROBE.
Interim rept. for Dec 62-Nov 64,
by Donald E. Adams. Mar 65, 64p
Contract AF33 657 7774, Proj. 7063, Task 706301
ARL 65-47 Unclassified report

See also AD-404 619.

Descriptors: (*Enthalpy, Measurement), (*High-temperature research, Enthalpy), (*Calorimeters, Enthalpy), Films, Liquids, Evaporation, Film Cooling, Gases, Temperature, Pressure, Heat transfer.

The probe can operate continuously in a high temperature environment, such as an arc. By evaporating a liquid film, the probe cools a hot gas stream to a temperature capable of being measured by conventional instrumentation. The exit temperature and composition of the gas provide the major information for an energy balance on the system. Calculation of the enthalpy of the hot gas is then possible. Several probe models, ranging in outside diameter from 0.10 to 0.050 inch, were fabricated and tested. To simplify internal transpiration studies, the larger probes were separately cooled externally by forced convection. Later probes were entirely cooled by evaporating films permitting greater miniaturization. Improvements in successive probe models are discussed. These improvements were implemented by studies on models utilizing separate internal and external transpiration coolant channels and by applying small diameter (0.001 inch) orifices. Analytical results which may be useful in probe design are also given. An instrument for measuring the exit gas composition has been developed. The described model is structurally rigid for improved stability compared to previous models. The instrument operates with an accuracy compatible with enthalpy probe requirements. (Author)

AD-615 491 Div. 30/3, 08/2, 08/6
CFSTI Prices: HC$2.00 MF$0.50

Technischen Hochschule, Munich (West Germany). Elektrophysikalisches Institut.
MEASURING EQUIPMENTS FOR INVESTIGATIONS OF ULF-RADIATION,
by L. Rohrer. 1 Feb 65, 30p
Technical rept. no. TR-1
Contract AF61 052 725
AFCRL 65-269 Unclassified report

Descriptors: (*Electromagnetic waves, Measuring devices (Electrical and Electronic)), (*Measuring devices (Electrical and Electronic), Electromagnetic waves), Frequency meters, Extremely low frequency, Electronic recording systems, Test equipment, Design, Wiring diagrams, West Germany, Signal generators, Amplifiers.

For investigations of naturally occuring electromagnetic radiation with a period of 10 sec to 15 sec the necessary equipment has been developed. In the report are described an ULF-generator with an extremely short starting time, an amplifier with an input resistance of 70 x 10 to the 9th power ohms, and equipment for a frequency transformation by means of a tape recorder. (Author)

AD-615 504 Div. 24/3, 14/6
CFSTI Prices: HC$5.00 MF$1.00

Tronetics, Hollywood, Calif.

COLOR DISPLAYS BASED ON MAGNETOCHEMISTRY.
Final technical rept. for May 63-Nov 64,
by A. Dulyanai and Lyne Trimble. Mar 65, 162p
Contract AF30 602 2998, Proj. 5597, Task 559702
RADC TR-64-552
Unclassified report

Limited number of copies containing color other than black and white are available until stock is exhausted. Reproductions will be made in black and white only.

Descriptors: (*Color film, Magnetic materials), (*Display systems, Color film), (*Magnetic materials, Color film), Magnetostriction, Cobalt, Ferrites, Metal coatings, Antimony, Fracture (Mechanics), Iron, Pigments, Metalorganic compounds, Plastic coatings.

The report describes some studies and experiments performed to develop a color film which is responsive to a magnetic field. The film consists of randomly positioned particles of magnetostrictive material with outer shells of brittle metallic coatings. By applying a small external magnetic field (.007-.008 oersteds) to the film, the magnetostrictive material changes size and shape such that the coatings break and allow chemical reactions which result in colors. The investigation includes studies and experiments with magnetostrictive, transparent and brittle coatings and color forming chemicals. (Author)

AD-615 515 Div. 30/3, 07/3, 15/1
CFSTI Prices: HC$3.00 MF$0.75

Lincoln Lab., Mass. Inst. of Tech., Lexington.
SEQUENTIAL MEASUREMENT OF MULTIDIMENSIONAL TRANSDUCERS,
by J. R. Sklar. 29 Oct 64, 92p
Technical rept. nos. TR-360, RLE-431
Contract AF19 628 500
ESD TDR-64-567
Unclassified report

Descriptors: (*Transducers, Measurement), (*Sequential analysis, Measurement), Decoding, Communication systems, Coding, Sequences, Topology, Probability, Electrical impedance, Transmission lines.

A sequential algorithm suggested by R. M. Fano, Massachusetts Institute of Technology, is analyzed and its application to measurement problems is described. From the analysis, bounds to the average number of computations needed to estimate one parameter are obtained, and also a bound to the probability of estimating at least one parameter of a set incorrectly. When an attempt is made to differentiate between parameter values that produce too small an effect on the output, relative to the noise, the sequential method will fail. This difficulty determines a limit to the precision obtainable with the sequential method. A series of simulation experiments was performed to test the hypotheses and results of the theory. These experiments consisted of estimating the characteristic impedance values of the sections of a transmission line constructed of many short segments. Although the theoretical and simulated measurement problems were not identical, the theoretical and experimental results agree, at least qualitatively. (Author)

AD-615 529 Div. 30/3, 26/4
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ULTRASONIC FLAW DETECTOR,
by V. Shteglikh. 5 May 65, 7p FTD-TT-64-1382
TT 65-62296 Unclassified report

Unedited rough draft trans. of Russian patent 156,367, 23 Mar 62, appl. no. 770,172/26-10.

Descriptors: (*Ultrasonic radiation, Non-destructive testing), (*Non-destructive testing, Ultrasonic radiation), Ultrasonic radiation, Instrumentation, Patents, USSR, Monitors, Quality control.

An ultrasonic flaw detector (defectoscope) with a gate pulse for measuring a reflected signal from a definite depth zone. The detector contains a pulse generator, a generator of raised frequency connected with an ultrasonic emitter, a receiver of reflected pulses from an electron-beam tube, and two generators of voltage of rectangular form with one stationary state which is distinguished by the fact for the purpose of eliminating the effection of absorption on the intensity of the reflected signals subject to recording it is provided with integrating cascades, one of which integrates a U-shaped pulse of retardation of the gate pulse and control the first cascade of the amplifier of the receiver, and the second integrates the pulses after the first cascade of the amplifier and controls its third cascade. (Author)

AD-615 619 Div. 24/2
CFSTI Prices: HC$4.00 MF$1.00

Eastman Kodak Co., Rochester, N. Y. Apparatus and Optical Div.
PHOTOGRAPHIC LABORATORY, PORTABLE ES-39 (XH-1).
Final technical rept. for Jan 63-Jun 64.
May 65, 132p
Contract AF33 657 10437, Proj. 1530
SEG TR-65-13
Unclassified report

Descriptors: (*Photographic equipment, Laboratories), (*Laboratories, Photographic equipment), (*Photographic printers, Design), (*Photographic processors, Design), Portable, Photographic film, Photographic paper, Power supplies, Storage, Densimeters, Instrumentation.

A study and prototype of a Portable Photographic Laboratory was completed in response to Air Force requirements. This laboratory is self-contained, providing its own powersupply and environmental control system for worldwide application in support of the photographic processing equipment designed and developed aspart of this project. The Processor is designed to process 9 3/8-inch paper and 16mm, 35mm, 70mm, 5-inch and 9 1/2-inch film, either singly or in multiple strands up to and including the 5-inch width. The Projection Contact-Printer is designed for contact printing, 2X enlarging, and optional automatic dodging or masking in either mode. Included are supporting items such as a Sensitometer, Densitometer, Rewinder-Viewer, and supplies required for a continuous operational period of twenty-four hours. (Author)

AD-615 647 Div. 24/2, 02/4, 15/1, 25/4
CFSTI Prices: HC$3.00 MF$0.75

Itek Corp., Waltham, Mass.
STUDY OF IMAGE-EVALUATION TECHNIQUES.
Interim engineering rept. no. 10, 15 Oct 64-15 Jan 65.
15 Jan 65, 84p Rept. no. Itek-65-9048-11
Contract AF33 657 9158
Unclassified report

Descriptors: (*Aerial photography, Simulation), (*Photographic techniques, Analysis), (*Aerial reconnaissance, Mathematical models), Photographic images, Photographic lenses, Photographic emulsions, Fourier analysis, Photointerpretation, Optics.

The imaging of lines and edges in the presence of off-axis aberrations is discussed. Necessary formulas are derived and typical numerical data for third-order coma are presented. The use of weighting factors in attaining smooth convergence of Fourier series at a discontinuity is investigated. System transfer functions are determined and resolution is predicted using film image analysis. Emulsions are studied using coherent light apparatus.

AD-615 648 Div. 24/2, 02/4, 15/1, 25/4
CFSTI Prices: HC$3.00 MF$0.75

Itek Corp., Waltham, Mass.
STUDY OF IMAGE-EVALUATION TECHNIQUES.
Interim engineering rept. no. 11, 15 Jan-15 Apr 65.
15 Apr 65, 78p
Rept. no. Itek-65-9048-12
Contract AF33 657 9158 Unclassified report

Also includes Appendix A, Application of the Sampling Theorem to Optical Diffraction Theory, Richard Barakat, and Appendix B, Computation of the Total Illuminance (Encircled Energy) of an Optical System from the Design Data for Rotationally Symmetric Aberrations, Marie V. Morello, pub. in Optical Society of America. Journal v54 n7 p920-30, n2 p235-40 1964.

Descriptors: (*Aerial photography, Simulation), (*Photographic techniques, Diffraction analysis), (*Aerial reconnaissance, Mathematical models), (*Diffraction analysis, Photographic images), Optics, Photographic lenses, Photointerpretation.

Numerical results are given for various diffraction functions for optimum balanced third-order spherical aberration. The sampling theorem is applied to optical diffraction theory. The dangers inherent in optimum balancing techniques are discussed. The total illuminance of an optical system is computed from the design data for rotationally symmetric aberrations. The optical transfer function is determined directly from the edge spread function. A method of calculating the transfer function of an optical system in the presence of off-axis aberrations is introduced.

AD-615 695 Div. 30/3, 25/3

Oregon State Univ., Corvallis.
IMPROVED NMR PROBE FOR MAGNETIC FIELD MEASUREMENTS,
by W. L. Pierce and J. C. Hicks. 29 Oct 64, 2p
Grant AF AFOSR510 64
AFOSR 65-0786
Unclassified report

Pub. in Review of Scientific Instruments v36 n2 p202-3 Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Probes (Electromagnetic), Nuclear magnetic resonance), (*Nuclear magnetic resonance, Probes (Electromagnetic)), Spectrum analyzers, Oscillators, Transistors, Remote control systems, Magnetic fields, Superconductors, Solenoids.

A small, simple, transistorized, marginal-oscillator type nuclear magnetic resonance (NMR) spectrometer has been developed for high resolution mapping of magnetic fields in relatively inaccessible locations, such as the interior of superconducting solenoids. With a probe volume of 0.000008 liter, the device is able to give magnetic flux-density measurements to an accuracy of 2 parts in one million with a spatial resolution of about 1 mm. Remote operation of all controls adds considerable to its versatility. (Author)

AD-615 730 Div. 30/1
CFSTI Prices: HC$5.00 MF$1.25

System Development Corp., Santa Monica, Calif.
INDEX OF PUBLISHED PAPERS.
Professional paper,
by C. G. Lambert and M. J. Nicholson. 1 May 65, 188p
Rept. no. SP-0/000/04

Unclassified report

See also AD-606 166.

Descriptors: (*Indexes, Reports), (*Scientific research, Bibliographies), Periodicals, Subject indexing.

The annotated index lists papers written by members of the professional staff of the System Development Corporation. All of these papers appeared as books, as chapters of books, as articles in journals, and/or as reports in SDC's SP series between March 1956 and April 1965. (Author)

AD-615 740 Div. 30/4, 04/1
CFSTI Prices: HC$1.00 MF$0.50

Army Chemical Research and Development Labs., Edgewood Arsenal, Md.
A GLASS DISTRIBUTOR FOR LARGE CHROMATOGRAPHIC COLUMNS.
Rept. for Apr 63-Mar 64,
by Norwood K. Schaffer, A. R. Mitchell, and F. de Cesare.
Jun 65, 7p CRDLR-3291
Task 1A013001A03902

Unclassified report

Descriptors: (*Laboratory equipment, Chromatographic analysis), (*Chromatographic analysis, Laboratory equipment), Glass, Towers, Disks.

A glass distributor incorporating a sintered-glass disc is described. Component parts of the assemble consist of a glass tube inserted through a sintered-glass disc, three stabilizing, glass-rod side arms, and flanges on both sides of the tube securing it to the disc. The distributor permits the rapid addition of a large volume of sample to the surface of an adsorbent in a chromatographic column of wide diameter. (Author)

AD-615 761 Div. 30/1, 14/6, 17/7, 25/6
CFSTI Prices: HC$4.00 MF$0.75

Illinois Univ., Urbana.
MATERIALS RESEARCH LABORATORY.
Annual technical rept. for 1964-1965,
May 65, 103p

Unclassified report

Descriptors: (*Materials, Scientific research), Laboratories, Reviews, Glass, Crystals, Helium group gases, Superconductors, Semiconductors, Mass spectroscopy, Color centers, Solid state physics, Phase studies, Alloys, Crystal lattice defects, Radiation damage, Nuclear magnetic resonance, Cryogenics.

15. Military Sciences

AD-615 195 Div. 29/5, 14/4

Army Natick Labs., Mass.
WIND PENETRATION THROUGH FABRIC SYSTEMS; PART I,
by G. F. Fonseca and J. R. Breckenridge.
14 Feb 63, 9p

Unclassified report

Pub. in Textile Research Journal v35 n2 p95-103 Feb 1965.
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Textiles, Thermal insulation), (*Clothing, Thermal insulation), (*Wind, Clothing), Heat transfer coefficients, Temperature, Permeability, Measurement, Nylon, Cotton textiles, Plastics, Fibers (Synthetic), Porous materials, Design, Penetration.

Total and local heat transfer coefficients obtained on heated cylinders under similar environmental conditions of wind speed and air temperature are used as figures of merit for comparing fabric systems with different partitional dimensions and material compositions and covered by windbreaks of different permeability. It was found that two moderately air permeable windbreaks with a space between them could provide protection from wind penetration equal to or greater than a single windbreak of low permeability. It was also shown that the variation in heat loss around the cylinder was much greater with certain arrangements of fabric layers than with others even though the average (over-all) coefficients were often the same. This suggests that comparisons of fabric systems based on average or over-all insulating values may be highly misleading, since no indication of potential 'cold spots' in a wind (particularly on the windward side) is possible. (Author)

AD-615 196 Div. 26/5, 14/4

Army Natick Labs., Mass.
WIND PENETRATION THROUGH FABRIC SYSTEMS; PART II,
by G. F. Fonseca and J. R. Breckenridge.
14 Feb 63, 7p

Unclassified report

Pub. in Textile Research Journal v35 n3 p221-7 Mar 1965.
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Textiles, Thermal insulation), (*Clothing, Thermal insulation), (*Wind, Clothing), Heat transfer coefficients, Temperature, Permeability, Cold weather tests, Porous materials, Design, Penetration.

The earlier study of spaced double windbreak layers was extended to determine the decrease in effectiveness of such systems when porous materials are used in the intervening space to insure positive separation of layers. It was shown that mesh spacers caused little decrease in the efficiency of the system. Lower values of heat transfer coefficients were obtained by keeping the air penetration through the outer windbreak within the air handling capacity of the space than by letting large quantities of air into the space and blocking further penetration with an inner windbreak of low permeability. Where there was little penetration of the outer windbreak layer, the still air in the air space increased the insulation over that where the layers were unspaced. Results with loose-fitting systems were found to be similar to those for tight-fitting systems, provided that penetration of the inner windbreak was not excessive. Finally, the laboratory findings were corroborated by a field study of clothing incorporating the spaced-windbreak principle. (Author)

AD-615 261 Div. 18/3, 26/3, 30/2
CFSTI Prices: HC$3.00 MF$0.75

RAND Corp., Santa Monica, Calif.
DESCRIPTION OF THE COMPUTER PROGRAM FOR AGGREGATE BASE STOCKAGE POLICY OF RECOVERABLE ITEMS,
by John Lu and Gabriele Michels. Apr 65, 75p
Rept. no. RM-4395-PR
Contract AF49 638 700

Unclassified report

Rept. on Proj. Rand. See also AD-408 943.

Descriptors: (*Supply depots, Stock level control), (*Stock level control, Programming (Computers)), (*Inventory analysis, Programming (Computers)), (*Programming (Computers), Stock level control), Distribution (Economics), Digital computers, Costs, Recovery, Logistics, Air force equipment, Armed forces supplies, Air force procurement, Storage, Inventory.

This Memorandum describes a computer program that calculates stock levels across a set of recoverable items, which are generally characterized by high unit cost and low demand. The inventory policy followed is to reorder a unit whenever one is demanded. The assumed demand distribution is stuttering Poisson. The distribution of response time is arbitrary since only the mean response time needs to be known. The technique of Bayesian inference is used for demand prediction. Some salient features of the program are: (1) It adopts an aggregate approach to stock policy. (2) It provides for setting the most efficient base stock level to satisfy a specified aggregate performance rating with the least investment, and for generating a single computer run of sets of efficient base stock levels corresponding to levels of aggregate performance. (3) For computers with small storage capacity, it reduces the problem size by categorizing items according to their past demands and cost characteristics. (4) Execution time for the program is relatively short. The operating procedure is applicable to the RAND installation of IBM 7040-7044 computers. The program is written in FORTRAN IV (it is also available in FORTRAN II).

AD-615 263 Div. 18/1, 18/7
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
AN ATTACK-DEFENSE GAME WITH MATRIX STRATEGIES,
by N. D. Cohen. Mar 65, 33p
Rept. no. RM-4274-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Game theory, Military tactics), (*Military strategy, Game theory), Matrix algebra.

This memorandum presents the results and the method of analysis for an attack-defense game involving allocation of resources. Each player is assumed to have several different types of resources to be divided in an optimal fashion among a fixed set of targets. The payoff function of the game is convex. The 'No Soft-Spot' principle of M. Dresher, and the concept of the generalized inverse of a matrix are used to determine optimal strategies for each player and the value of the game. (Author)

AD-615 391 Div. 18/1, 13/11
CFSTI Prices: HC$4.00 MF$0.75

IIT Research Inst., Chicago, Ill.
SHELTER FIRE VULNERABILITY - SURVEY AND

ANALYSIS OF REPRESENTATIVE BUILDINGS.
Final rept.,
by R. B. Varley and G. L. Maatman. 17 Mar 65, 101p
Contract OCD OS62 210, Proj. N6005
Unclassified report

Descriptors: (*Shelters, Fire safety), (*Fire safety, Shelters), (*Radioactive fallout, Shelters), Fire extinguishers, Fires, Vulnerability, Nuclear explosion damage, Structural properties, Civil defense systems, Hazards.

The vulnerability of fallout shelters to fires from accidental sources as well as from direct nuclear weapon effects are evaluated. This was accomplished by survey and analysis of 102 stocked shelter buildings in eleven cities chosen to give reasonable diversity in size, industrial and commercial emphasis, and geographic location. Operational guidance developed for the selection and upgrading of shelter buildings and recommended fallout shelter provisions for public building codes are established for both existing structures and new construction. Areas for future study and development are identified. (Author)

AD-615 482 Div. 18/3
CFSTI Prices: HC$2.00 MF$0.50

Virginia Polytechnic Inst., Blacksburg.
A MILITARY TRUCK-TRANSPORT MODEL,
by H. J. Charlton. May 65, 29p
Grant DA AMC44 177 63G8, Task 1A010501B010
TRECOM TR-64-51
Unclassified report

Descriptors: (*Logistics, Operation research), (*Operations research, Logistics), Integral equations, Partial differential equations, Matrix algebra, Mathematical models, Armed forces transportation.

The report is an application of the radiation transport theory to ground logistics supply. The study evaluates the effectiveness of a supply system subject to attrition due to various causes, such as enemy fire, harassment and other causes of failure to carry out the logistics mission toward forward areas. (Author)

AD-615 640 Div. 18/1, 13/1, 20/6
CFSTI Prices: HC$3.00 MF$0.50

Protective Structures Development Center, Fort Belvoir, Va.
EVALUATION OF 200-PERSON SHELTER (VENTILATION).
Rept. for 29 Sep-1 Oct 63,
by O. W. Svaeri. 1 Apr 65, 52p PSDC-TR-6
Unclassified report

Descriptors: (*Shelters, Ventilation), (*Radioactive fallout, Shelters), Civil defense systems, Thermal properties, Temperature, Humidity, Heat transfer.

Observations were made of the thermal environment in the basement portion of a box shaped reinforced concrete 200 person shelter when the shelter was supplied with a minimum quantity of ventilation air. Also, an evaluation was made of the distribution of the ventilation air in the shelter as measured by variations in effective temperature, when the air was supplied through a duct system and through a single point source. Ventilation air conditioned to simulate a 1% design day in the Washington, D. C. area (i.e. air at dry bulb and wet bulb temperatures which will not be exceeded more than 1% of the time), was supplied to the shelter area tested. Approximately 100 simulated occupants were placed in the shelter basement to generate the same amount of heat and moisture as 100 human occupants. When conditioned air was supplied at a minimum rate of 3 cfm per person, effective temperatures as high as 90 deg were attained and maintained within the shelter. Based on current standards for the thermal environment in shelters, it is concluded that a minimum ventilation rate of 3 cfm is not adequate for cooling this shelter space.

AD-615 709 Div. 18/7, 18/4, 32/8
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
ONE MAN'S OPINION OF WAR IN EUROPE: A BOOK REVIEW,
by E. Vandevanter, Jr. May 65, 8p
Rept. no. P-3143
Unclassified report

Book review of Otto Heilbrunn, Conventional War in the Nuclear Age, Frederick A. Praeger, Inc., New York, 1965.

Descriptors: (*Europe, Military strategy), (*Warfare, Reviews), Strategic warfare, Nuclear warfare, Costs, Effectiveness, Political science.

AD-615 725 Div. 18/1
CFSTI Prices: HC$7.00 MF$1.75

National League of Cities, Washington, D. C. Dept. of Urban Studies.
INTERGOVERNMENTAL CIVIL DEFENSE ORGANIZATIONS AND PROGRAMS.
Final rept.,
by Lawrence A. Williams, Peter D. Veillette, and Andrew S. Bullis. Apr 65, 310p
Contract OCD PS64 52, Task 4412B
Unclassified report

Descriptors: (*Civil defense systems, Urban areas), (*Urban areas, Civil defense systems), Operation, Leadership, Attitudes, Public opinion.

Patterns of local government and the jurisdictional impediments to the effective performance of local services are described and related to civil defense organizational problems. The major alternative approaches to local government jurisdictional reorganization and the advantages and disadvantages attributed to each are examined. Three inter-local government civil defense agencies are treated on a case study basis. Emphasis is placed upon local government civil defense organization, powers, and intergovernmental relationships. Attention is given to (1) the role of the states, (2) methods of policy formulation, (3) arrangements for politically responsible supervision, (4) arrangements for establishing authority for unified and coordinated emergency operations, (5) procedures for allocating costs, and (6) the increments in civil defense capability resulting from area-wide organizations. The views of local elected officials in eight metropolitan areas relative to civil defense and civil defense organizational patterns are analyzed. (Author)

AD-615 733 Div. 18/7, 18/3, 18/6, 32/8
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
INSURGENCY AND COUNTERINSURGENCY: NEW MYTHS AND OLD REALITIES,
by Charles Wolf, Jr. May 65, 24p Rept. no. P-3132
Unclassified report

Descriptors: (*Guerrilla warfare, Counterinsurgency),

(*Counterinsurgency, Guerrilla warfare), Economic warfare, Leadership, Military intelligence, Government (Foreign), Political science, Recruiting, Logistics, Psychological warfare.

Measures for counteracting insurgency in underdeveloped countries are proposed. These measures do not depend on popular support in the theater of operations.

16. Missile Technology

AD-615 569 Div. 12/1, 15/1, 25/6
CFSTI Prices: HC$3.00 MF$0.75

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
TRAJECTORY EQUATIONS FOR A SIX-DEGREE-OF-FREEDOM MISSILE.
Technical memo.,
by Bruce Barnett. May 62, 65p FRL-TM-25
Unclassified report

Descriptors: (*Guided missile trajectories, Differential equations), (*Differential equations, Guided missile trajectories), Gravity, Moments, Force (Mechanics), Matrix algebra, Density, Mathematical models, Euler's angles, Rotation.

Two sets of six-degree-of freedom equations of motion for a symmetric missile are derived explicitly. One set is based upon a coordinate system that is rigidly attached to the missile (body-fixed system), while in the second set (fixed-plane system) a coordinate system with one axis constrained to lie in a given plane is employed to derive the equations of motion. Both sets of equations assume the earth to be spherical, include the effect of the earth's rotation, and consider variable wind. In addition, for the body-fixed system, discussion of initial conditions and singularities of the differential equations is presented. (Author)

17. Navigation, Communications, Detection, and Countermeasures

AD-615 228 Div. 19/4
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ABOUT THE STABILITY OF MOTION OF A GYROSCOPIC PENDULUM,
by V. F. Lyashenko. 19 Apr 65, 9p
FTD-TT-64-1175
TT 65-62228
Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Izvestiya. Mekhanika i Mashinostroenie n4 p3-6 1963.

Descriptors: (*Gyroscopes, Stability), Integral equations, Differential equations, Dynamics, Motion, USSR.

Discussion is held on the Shuler gyroscopic pendulum. The first integral of equations of motion of a gyro pendulum is formulated, and used for the obtainment of sufficient stability conditions of an imperturbed movement of the system.

AD-615 266 Div. 19/3, 33/1
CFSTI Prices: HC$3.00 MF$0.75

National Aviation Facilities Experimental Center, Atlantic City, N. J. Experimentation Div.
IMPROVED EQUIPMENT ARRANGEMENTS FOR ARTC CENTERS.
Final rept.,
by George A. Scott, P. W. Bradbury, J. H. Eichenlaub, and R. H. Mitchell. Mar 65, 97p
Proj. 150 523 01X
SRDS RD-65-27
Unclassified report

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Descriptors: (*Air traffic control systems, Operations research), Experimental data, Configuration, Systems engineering.

This report describes the continued experimental development and testing effort directed toward in-service improvements to existing Air Route Traffic Control operational equipments. Through the use of an environmental laboratory, the In-line, Peninsula and Island console designs were established, modified and appraised. Field controller opinion and recommendations were used as a basis for determining the advantages or disadvantages of particular equipments and their locations, console modifications and configurations. The report recommends the most favorable placement of operational equipments and controls, as well as substantial improvements in sector lighting, information displays and hardware modification. (Author)

AD-615 267 Div. 19/3, 08/2
CFSTI Prices: HC$2.00 MF$0.50

National Aviation Facilities Experimental Center, Atlantic City, N. J.
EVALUATION OF BEACON VIDEO DEFRUITING EQUIPMENT (STORAGE TUBE), TYPE FAA-R-1400.
Final rept.,
by Anthony J. Bradley. Feb 65, 40p
Proj. 242 001 03V
SRDS RD-65-18
Unclassified report

Descriptors: (*Air traffic control systems, Identification systems), (*Identification systems, Air traffic control systems), Radar equipment, Storage tubes, Beacons, Video signals.

An evaluation of a Beacon Video Defruiting Equipment (Storage Tube), Type FAA-R-1400, was conducted to determine its effectiveness as a fruit eliminator. In addition, an assessment was made of the stability of the defruiter performance as well as the maintainability of the equipment. The Type FAA-R-1400 defruiter, purchased from Airborne Instruments Laboratory was designed to eliminate a synchronous beacon video and to pass only the desired synchronous beacon video. Fruit-output rate measurements were taken over a range of simulated fruit-input conditions andthen compared to the anticipated fruit-output rate calculated for each fruit-input condition. The evaluation included a 72-hour stability test as well as consideration of the various maintenance aspects of the equipment. It was concluded that the Beacon Video Defruiting Equipment (Storage Tube), Type FAA-R-1400, is effective as a fruit eliminator provided the delayed-video threshold controls are properly aligned. It was also concluded that the defruiter is easily maintained and when properly aligned and adjusted, operation is stable.

AD-615 396 Div. 05/5, 05/4, 18/5
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
A BRIEFING ON THE DISTRIBUTED ADAPTIVE MESSAGE-BLOCK NETWORK,
by Paul Baran. Apr 65, 35p Rept. no. P-3127
Unclassified report

Descriptors: (*Adaptive communication systems, Military requirements), (*Command and control systems, Military requirements), Data transmission systems, Electrical networks, Communication systems.

AD-615 407 Div. 06/1, 02/7
CFSTI Prices: HC$2.00 MF$0.50

Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
METEOROLOGICAL TECHNIQUES FOR SOUND RANGING.
Interim rept. no. 1, 1Oct 64-28 Feb 65,
2 Mar 65, 26p Rept. no. 1235
Contract DA28 043AMC00151E, Proj. 1V025001A126 01 11
Unclassified report

Revision of manuscript submitted 21 Jan 64.

Descriptors: (*Sound ranging, Meteorology), (*Meteorological phenomena, Sound ranging), Acoustics, Atmosphere, Boundary layer, Programming (Computers).

The propagation of sound through the atmospheric boundary layer is studied as it relates to the sound ranging problem. Existing techniques for applying meteorological corrections to sound ranging data are evaluated. A procedure is developed for applying these meteorological corrections to sound ranging data for improved accuracy. The results of preliminary analytical and computer studies of selected Ft. Sill firing data are presented.

AD-615 418 Div. 19/4, 19/5
CFSTI Prices: HC$4.00 MF$1.00

Instrumentation Lab., Mass. Inst. of Tech., Cambridge.
APPLICATION OF INERTIAL LOCATOR CONCEPTS TO FAA BASIC FLIGHT INSPECTION. VOLUME I.
Final rept.,
by Robert L. Hall and John Hatfield. Jan 65, 119p
Rept. no. R-483
Contract FA64WA5139, Proj. 341 001 01N
SRDS RD-65-9

Unclassified report

Descriptors: (*Inertial navigation, Instrumentation), (*Position finding, Feasibility studies), Detectors, Aircraft, Flight simulators, Instrument landings.

Feasibility studies were made of utilizing an airborne inertial navigation system (inertial locator equipment) to provide aircraft position information to the FAA Basic Flight Inspection System. Design objectives were established for the flight inspection of VOR, VORTAC, and TACAN stations and Instrument Landing Systems (ILS). Analyses were made, including simulated computer flights, of the capabilities of inertial equipment to perform in the flight inspection missions. Conclusions, based on assumed inertial system performance, indicate that the use of inertial locator equipment is feasible, using updating techniques for some missions. Recommendations are made for a flight demonstration program. (Author)

AD-615 434 Div. 06/7
CFSTI Prices: HC$2.00 MF$0.50

Vidya Div., Itek Corp., Palo Alto, Calif.
AIRBORNE SPECTRAL-RECONNAISSANCE SYSTEM VELA CLOUD GAP PROGRAM.
Final rept.,
by John E. Wilson, Callie Lukermann Craig, Charles W. Hanson, Donald H. Kelly, and Thomas W. Mark. 20 Mar 65, 45p Rept. no. 179
Contract AF33 657 7381, Proj. 9035; ARPA Order 500, Task 7 10
AFCRL 65-197

Unclassified report

See also AD-406 453.

Descriptors: (*Aerial reconnaissance, Underground explosions), (*Nuclear explosions, Underground explosions), (*Spectrum analyzers, Airborne), Detection.

The nine-lens camera built as a prototype instrument for Project VELA has been redesigned and rebuilt, and is operating well. Redesigned or replaced parts in the new camera include: a stainless-steel shutter curtain; lenses individually focused for best resolution in each band; adjustable fiducial markers which allow optical registration in composite printing; new optical projection counters; a new electrical remote-control box and system console. Other improvements have been made to increase reliability and reduce maintenance. The Maurer P-220 cameras of the prototype multiband system have been replaced with Mitchell-Vinten F-95 70-mm reconnaissance cameras, which are performing more reliably. The 14L Block spectrometer has been intensively tested, and previous difficulties with this instrument have been isolated. Its unsuitability appears to be due to the nonlinear response of the light-biased cadmium selenide detector. Nonlinearities cannot be corrected by means of the present data-reduction system. The 14L spectrometer, therefore, is not recommended for further use. The spectrometers with silicon solar detectors were satisfactory.

AD-615 474 Div. 06/7, 02/10, 20/2

Utah Univ., Salt Lake City.
A STUDY OF PS CONVERTED WAVES.
Final rept. for Oct 61-Mar 65,
by Kenneth L. Cook and John K. Costain. 30 Apr 65, 157p
Contract AF19 628 201, Proj. 8652, ARPA Order 180 16, Tasks 865202, 2
AFCRL 65-258

Unclassified report

Rept. on Proj. VELA-UNIFORM.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is not available for public sale.

Descriptors: (*Seismic waves, Detection), (*Nuclear explosions, Underground explosions), (*Underground explosions, Nuclear explosions), Earthquakes, Seismographs, Seismological stations.

The purpose of this investigation was to make a detailed study of the fundamental properties of PS converted waves to ascertain whether they can be detected consistently on seismograms from both underground nuclear explosions and earthquakes and whether they can be used to help distinguish underground nuclear explosions from earthquakes. The study included: (a) Theoretical considerations of the amplitudes of PS and other converted waves as compared to observed amplitudes. (b) Harmonic analysis of seismograms to aid in the interpretation. (c) Analysis of seismograms of underground nuclear explosions and large, distant earthquakes recorded at the University of Utah seismograph stations and other selected stations to develop dependable criteria for recognition of PS converted waves on seismograms. (d) The analysis of selected seismograms from underground nuclear explosions for recognition of PS converted waves recorded by vertical- and horizontal-component seismometers at the Geotech field stations.

AD-615 497 Div. 06/1
CFSTI Prices: HC$4.00 MF$0.75

Wagner (Daniel H.) Associates, Paoli, Pa.
THEORY OF CUMULATIVE DETECTION PROBABILITY,
by Edward P. Loane, Henry R. Richardson, and Edward S. Boylan. 10 Nov 64, 106p
Contract N140 70024 74322B

Unclassified report

Descriptors: (*Sonar signals, Detection), (*Probability, Detection), Statistical processes, Search theory, Optimization.

Cumulative detection probability, cdp, is defined as probability of at least one success in n trials. 'Success' means that the (signal) stochastic process exceeds a given threshold. Exact formulas or approximations for cdp are given in the cases where the process being sampled in the trials is two-state Markov, Gaussian, 'step, 'and' step-plus-jitter.' In the two-state Markov case, taken largely from others, k-success formulas are also given. Finding cdp is equivalent to finding the distribution of the maximum of a sequence of random variables and to finding a cumulative multivariate distribution. (Author)

AD-615 514 Div. 06/6, 12/6, 15/1, 15/2
CFSTI Prices: HC$2.00 MF$0.50

Boeing Scientific Research Labs., Seattle, Wash.
FURTHER STATISTICAL PROBLEMS OF TRACKING A TARGET FROM AN OBSERVATORY SATELLITE.

Mathematical Note, revised ed.,
by Sam C. Saunders. Apr 65, 47p
Rept. nos. D1-82-0390, MN-377
Unclassified report

Revision of rept. titled, On the Estimation of Location Coordinates from Data Taken from a Manned Orbital Laboratory, 1964.
Also available from the author.
See also AD-615 514.

Descriptors: (*Radar tracking, Surface targets), (*Reconnaissance satellites, Radar tracking), (*Statistical analysis, Radar tracking), Position finding, Errors, Manned spacecraft, Matrix algebra, Partial differential equations.

The statistical problems of estimation and confidence are studied for both the location and speed and heading of a target following a linear course when tracked by radar from an Observatory Satellite. The assumptions are specified upon which the analysis of the subsequent sections is based. The joint distribution of the estimates for target position is derived. The maximum likelihood estimate of target position is obtained and a proof given that it is normally distributed. A detailed comparison is given of the mathematical models of this and the earlier report, and of the important theorems and formulas relating to each. Special cases are presented in which the results can be expressed in a simplified form. Confidence regions are given for target speed and heading. The possibilities for tracking a target are dealt with in a dense environment given certain information on the distribution of target speeds anddirections. (Author)

AD-615 526 Div. 05/2, 05/5, 08/1, 25/4
CFSTI Prices: HC$2.00 MF$0.50

IIT Research Inst., Chicago, Ill.
CONTINUOUS FACSIMILE SCANNER EMPLOYING FIBER OPTICS.
Quarterly rept. no. 2, 1 Oct-31 Dec 64,
by Donald A. Pontarelli. Jan 65, 29p
IITRI-A6093-6
Contract DA28 043AMC00164E, Task 1E6 34301D246 03 06
ECOM 00614-2
Unclassified report

See also AD-613 302.

Descriptors: (*Scanning, Fiber optics), (*Fiber optics, Scanning), (*Facsimile equipment, Fiber optics), Facsimile transmission, Illumination, Surface properties, Brightness, Interference, Radio waves, Oscillators, Transmitter-receivers.

Effort was concentrated primarily towards design and fabrication of a test model to incorporate the fiber optics package suited to the space requirements dictated by the physical configurations of the GXC-5 facsimile transmitter. A copy transport mechanism was designed with a temporary drive attached in order to make it operable for a test program. Continued investigation with extensive consideration being given towards means for increasing copy illumination level. Study initiated to determine susceptibility to radio frequency interference. (Author)

AD-615 532 Div. 06/6, 02/7, 08/2, 15/2
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
EQUIPMENT FOR STUDYING THE STATISTICAL CHARACTERISTICS OF RADIO ECHOS,
by A. G. Gorelik. 4 May 65, 13p FTD-TT-65-97
TT 65-62299 Unclassified report

Unedited rough draft trans. of mono. Vsesoyuznoe Nauchnoe Meteorologicheskoe Soveshchanie (All-Union Scientific Meteorological Conference) (no. 1) Leningrad, 1961. Trudy, v9 1963, p161-6.

Descriptors: (*Meteorological radar, Radar equipment), (*Statistical analysis, Radar signals), Channel selectors, Spectrum analyzers, Switching circuits, Delay circuits, Filters (Electromagnetic wave).

Realization of a method of measuring meteorological parameters led to the creation of auxiliary equipment for radar stations used foraerological studies.

AD-615 545 Div. 08/3, 15/1, 15/2
CFSTI Prices: HC$3.00 MF$0.75

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
SMALL SAMPLE SEQUENTIAL DETECTION OF RICEAN DISTRIBUTED SIGNALS,
by Joseph Wakeley, Jr. Jun 65, 62p
Research Rept. no. PIBMRI-1248-64
Contract AF49 638 1402
AFOSR 65-0514
Unclassified report

Descriptors: (*Detection, Radio signals), (*Sequential analysis, Radio signals), Statistical distributions, Sampling, Statistical tests, Probability, Errors, Noise (Radio), Microwave frequency.

A method is considered of evaluating small average sample size (1.0 to 1.2) sequential detection of Ricean distributed signals. Useful approximations for this method of testing were formulated by A. Wald using large average sample sizes. These relationships do not hold for small average sample sizes. A solution is presented for this method of testing and the results compared to Wald's approximation. In addition this testing method is compared with fixed sample size and null-zone detection (sequential test without memory). It is shown that sequential detection has a significant improvement over fixed sample testing and may be approximated by the null-zone detector for small average sample sizes. Some remarks are included on truncating the sequential detector after the second sample. The distribution dealt with in this report, the Ricean, describes the envelope of a sine wave plus noise, common in many physical situations for example radar target detection. (Author)

AD-615 549 Div. 08/7, 18/4
CFSTI Prices: HC$4.00 MF$1.00

Technical Operations Research, Burlington, Mass.
MODELS OF COMMAND AND CONTROL SYSTEMS (WITH APPLICATIONS TO EXERCISE AND EVALUATION).
Final rept. for 30 Nov 63-31 Jan 65,
by Peter Kugel and Martin F. Owens. Feb 65, 144p
Contract AF19 628 2455, Proj. 2801
ESD TDR-65-183
Unclassified report

Descriptors: (*Command and control systems, Mathematical models), (*Communication theory, Command and control systems), Decision making, Operations research, Systems engineering, Data processing systems, Automata, Design, Language, Set theory, Analysis, Tapes, Effectiveness, Probability.

Five models of the activities of command and control systems are described to provide a precise, if not necessarily quantitative, framework within which the behavior of

command and control systems can be studied. The Deductive Inference Model describes information processing as the manipulation of strings according to explicitly given rules. In terms of such a description, this model deals with the processes of problem identification and problem solving. The Inductive Inference Model deals with information processing for which the system must derive the rules that are to be used. It relates the assumptions that such a system makes and the inductive strategies that it uses to the adequacy of its predictions and generalizations. The Value Model treats a command and control system as a system that applies the values of the commander. It attempts to relate measurable features of the values held by personnel to the kinds of decisions that they make. The Semantic Model tries to deal with the manner in which command and control systems and their personnel represent their information about their environment. The Finite Automaton Model treats a command and control system and exercise controllers in certain types of controlled exercises as coupled sequential machines (finite automata). It provides a vehicle for studying the ability of the exerciser to control the behavior of the system and for studying an exercise as a learning situation. (Author)

AD-615 567 Div. 05/2, 05/4, 05/5

Defense Communications Agency, Washington, D. C.
DEFENSE COMMUNICATIONS SYSTEM (DCS). ENGINEERING-INSTALLATION STANDARDS MANUAL.
1 Apr 63, 96p DCA-CIR-175-2A
Unclassified report

Available from Superintendent of Documents, GPO, Washington, D. C., 20402, $1.00, as D5.104:175-2A.

Descriptors: (*Communication systems, Defense systems), (*Defense systems, Communication systems), Engineering, Installation, Instruction manuals, Radio-frequency, Very low frequency, Low frequency, Medium frequency, Switching circuits, Standards, Telephone equipment, Teletype systems, Facsimile equipment, Television equipment.

Engineering-Installation Standards as they apply to the Defense Communications System (DCS) are those standards which provide quantitative and qualitative values and measures for obtaining uniformity of controls governing engineering and installation of equipment, facilities, and systems. Included in the category of DCS Engineering-Installation Standards are: Standards for system engineering such as signal level, impedances, modulation rate, frequency and time tolerances, distortion tolerances, and measurement techniques; standards for field engineering such as antenna design andorientation, and transmission line design; and standards for installation engineering such as equipment arrangements and layout, uniform construction requirements and site preparation. The DCA will prescribe the utilization of standards in three areas; development, engineering, and operations. Standards are-- (a) Design: MIL-STD-188( ), published by OSD. (b) Engineering: DCS Engineering-Installation Standards published by DCA (this circular). (c) Operations: DCS Operating Standards published by DCA (DCA Circular 55-1).

AD-615 612 Div. 06/1, 14/10
CFSTI Prices: HC$2.00 MF$0.50

Destroyer Development Group Pacific, Long Beach, Calif.
REPORT OF SONAR TACTICAL RANGE RECORDER PAPER EVALUATION.
Dec 64, 28p Unclassified report

Descriptors: (*Recording paper, Tests), (*Sonar, Recording paper), Recording systems, Tactical warfare, Military requirements, Procurement.

Four types of electrosensitive recording paper, Admiralty Pattern A-1266, Alfax Type E, Alfax Type S, and Sangamo Fluorescent Chart Paper were comparatively tested in order to determine the optimum paper to use with the Tactical Range Recorders. Papers were tested with respect to sensitivity, writing contrast, trace definition and retention of trace. Of the four types of paper tested, Admiralty Pattern A-1266 is the most desirable choice for use in existing Tactical Range Recorders. ALFAX Type E is an acceptable substitute but possesses some slightly inferior characteristics. The remaining papers are definitely inferior.

AD-615 637 Div. 06/6
CFSTI Prices: HC$3.00 MF$0.75

Signatron, Inc., Lexington, Mass.
RADAR SEQUENTIAL DETECTION TECHNIQUES STUDY.
Final rept. for Dec 63-Dec 64, by Julian Bussgang. Apr 65, 94p
Contract AF30 602 3274, Proj. 4506, Task 450601
RADC TR-65-10
Unclassified report

Descriptors: (*Radar signals, Radar scanning), (*Detection, Targets), (*Communication theory, Sequential analysis), Search radar, Electronic scanners.

This report presents the results of a study of sequential detection techniques suitable for an electronic scan radar. The search sector of the radar is considered subdivided into many beam pointing positions and the range along any beam direction into several range bins. The number of pulses allotted in each beam pointing position is varied according to the energy received in the position being examined and is also limited by the time spent in previous positions. The purpose of the time constraint is to assure that the antenna beam returns to each position within a specified frame time. The adopted rule for allotting the quota of pulses in each beam position is called the Cyclic Queue Allotment Rule (CQAR). If the frame contains sufficient beam positions the analysis shows appreciable energy savings over both a uniform scan and a sequential scan truncated after a fixed number of pulses. The effect of multiple range bins is also analyzed using an 'absorbing barrier' model; it is established that sequential procedures can be profitably used even when a large number of parallel range and velocity bins is tested. The increase in energy savings (relative to a fixed test) over the estimates made in previous studies is caused by introducing in the analysis the range dependence of the signal-to-noise ratio. The procedure for detecting a fluctuating target is formulated and two methods are outlined for scan-to-scan and pulse-to-pulse fluctuations. The results of this study will be encouraging to those who previously found the savings of a sequential procedure insufficient to justify a change from the conventional uniform scan. (Author)

AD-615 650 Div. 06/6, 08/2
CFSTI Prices: HC$1.00 MF$0.50

Army Electronics Command, Fort Monmouth, N. J.
NANOSECOND PULSE TECHNIQUES,
by Michael A. Fanuele. Mar 65, 22p ECOM-2565
Proj. 1P6 20901A188, Task 1P6 20901A188 01
Unclassified report

Descriptors: (*Pulse generators, Feasibility studies), (*Target acquisition, Radar), Thyratrons, Transistors, Switching circuits, Diodes, Radiofrequency pulses.

As part of a USAECOM program to study the feasibility of applying high resolution techniques to combat surveillance radars, selected electronic switching devices capable of generating nanosecond pulses were investigated and certain operational characteristics determined. These devices were: hydrogen thyratrons, switching transistors, avalanche transistors, and snap-off diodes. Pulses were generated down to one nanosecond at pulse repetition frequencies up to 50 megacycles. Hydrogen thyratrons and avalanche transistors were used in modulators to produce RF pulses approximately ten nanoseconds wide. Further investigations into the various schemes for developing nanosecond pulses are recommended as well as efforts toward development of additional nanosecond pulse techniques. (Author)

18. Nuclear Science and Technology

AD-615 202 Div. 20/2
CFSTI Prices: HC$3.00 MF$0.75

Space General Corp., El Monte, Calif.
EARTH CURRENTS FROM UNDERGROUND NUCLEAR DETONATIONS,
Final rept.
4 Jun 62, 54p SGC-43R-18
Contract AF33 600 42406

Unclassified report

Rept. on Projs. GNOME and HARDHAT.

Descriptors: (*Nuclear explosions, Monitors), (*Underground explosions, Nuclear explosions), (*Electromagnetic fields, Nuclear explosions), Electromagnetic waves, Plasma medium, Instrumentation, Theory, Experimental data.

Experimental facilities were established for the GNOME and HARDHAT tests to measure and record the components of the electromagnetic field generated by underground nuclear detonations. In addition an instrumentation system was established at the GNOME site to investigate the characteristics of the plasma generated by the blast to obtain information concerning the nature and source of the electromagnetic field. Data obtained from the tests shows that the electromagnetic signals generated by low-yield close-coupled underground nuclear explosions are small in magnitude and cannot be detected above background noise at distances greater than a few kilometers from ground zero. Final conclusions concerning the feasibility of electromagnetic detection of decoupled underground nuclear detonations can be made only after the electromagnetic signals from such explosions have actually been measured.

AD-615 217 Div. 20/5
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
REPRODUCTION OF ACCELERATION PROCESSES OF NUCLEAR REACTORS ON ELECTRON MODELING INSTALLATIONS,
by B. Ya. Kogan. 15 Apr 65, 21p
FTD-TT-64-1127
TT 65-62217

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Izvestiya. Energetika i Transport, n4 p36-47 1960.

Descriptors: (*Power reactors, Reactor kinetics), (*Reactor kinetics, Models (Simulations)), Acceleration, Training devices, Electrons, Circuits, Relays, Control systems, Analog systems, Electronic equipment, Equations, USSR.

A scheme is proposed for the electronic modeling of nuclear reactor starting problems. Topics include: Basic equations of reactor acceleration; solution of acceleration equations by sections; causes of errors in solutions; studying starting processes with the aid of equations which are pre-transformed into logarithmic power representations.

AD-615 339 Div. 20/3
CFSTI Prices: HC$2.00 MF$0.50

Radiation Effects Information Center, Columbus, Ohio.
A SELECTED BIBLIOGRAPHY OF PULSED RADIATION EFFECTS,
comp. by W. H. Veazie and S. F. Collier. 1 Jun 63, 32p REIC-M-24
Contract AF33 657 10085, Projs. 7381, 7634, Task 738103

Unclassified report

Descriptors: (*Radiation damage, Bibliographies), (*Bibliographies, Radiation damage), Materials, Electronic equipment, Semiconductor devices.

The bibliography is divided into three parts: reports generaged by industrial organizations, reports generated by government laboratories, and miscellaneous references.

AD-615 343 Div. 20/6, 25/6
CFSTI Prices: HC$1.00 MF$0.50

Atomics International, Canoga Park, Calif.
SUPERCONDUCTING NUCLEAR PARTICLE DETECTOR,
Trimonthly rept. for 15 Feb-15 May 65.
15 May 65, 17p AI-65-108
Contract DA18 035AMC107A

Unclassified report

Descriptors: (*Radiation measurement systems, Superconductors), (*Superconductors, Radiation measurement systems), Alpha particle detectors, Cryogenics, Partial differential equations, Films, Indium, Tin.

Electron-electron and electron-phonon interactions in thin films are discussed. Digital computer solutions were carried out for the nonlinear partial differential equation that results if lattice heat is included in the calculations. A series of indium films was evaporated on quartz and glass discs, and used to examine the tentative conclusion that the lattice plays no significant role in the dynamics of alpha detection. A series of film testing probes was constructed and tested.

AD-615 389 Div. 20/5
CFSTI Prices: HC$5.00 MF$1.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
GROUP CONSTANTS FOR DESIGNING OF NUCLEAR REACTORS,
by L. P. Abagyan, N. O. Bazazyants, I. I. Bondarenko, and M. N. Nikolaev. 18 May 65, 153p FTD-MT-65-45
TT 65-62280

Unclassified report

Edited machine trans. of mono. Gruppovye Konstanty dlya Rascheta Yadernykh Reaktorov, Moscow, 1964, pl-139.

Descriptors: (*Nuclear reactors, Design), Reactor materials, Fission products, Neutron cross sections, Nuclear scattering, USSR.

AD-615 518 Div. 20/6, 18/1

Naval Civil Engineering Lab., Port Hueneme, Calif.
NEUTRON STREAMING THROUGH HYDROGENOUS MEDIA,
by Leonard B. Gardner, Alan J. Mettler, and Donald L. Peterson. 10 May 65, 130p
Technical Note no. N-709
Proj. Y F008 08 05 201, Task DASA 11 026

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is not available for public sale.

Descriptors: (*Neutron flux, Aliphatic compounds), (*Shelters, Shielding), (*Shielding, Neutron flux), Ducts, Neutron detectors, Neutron spectrum, Programming (Computers), Concrete, Foils.

The study of neutron streaming through paraffin is reported herein. This work is essential to the beginning of experiments in which neutrons streaming through air ducts in concrete will be studied. In the study of neutron streaming through paraffin the energy spectra of the flux was measured by the activation of bare and cadmium covered foils, foil sandwiches, and threshold foils. Normalized foil response as a function of paraffin thickness is reported. Described is a sequence of computer programs for processing the radiometric data associated with foil activation. These programs are also suitable for handling other radiometric analysis problems. (Author)

AD-615 550 Div. 20/3, 25/6
CFSTI Prices: HC$2.00 MF$0.50

Parke Mathematical Labs., Inc., Carlisle, Mass.
INDIRECT DISPLACEMENT OF ATOMS IN SOLIDS BY KNOCK-ON IMPURITY ATOMS,
by Charles H. Sherman. Mar 65, 46p
Scientific rept. nos. SR-5, 2419-SR-5
Contract AF19 628 2419, Proj. 5620, Task 562002
AFCRL 65-255

Unclassified report

Descriptors: (*Radiation damage, Solids), (*Electron bombardment, Impurities), Atoms, Carbon, Rhodium, Platinum.

A cascade theory is developed in order to calculate the number of displaced atoms of a host material produced by knock-on impurity atoms. The theory is similar to the Kinchin-Pease cascade theory except that the atom which starts the cascade differs in mass from the other atoms with which it collides. The chief application of the theory is for evaluating the number of host displacements produced indirectly by knock-on impurities in radiation damage experiments. This is of interest as a sub-threshold effect and also as a possible source of error in determining the threshold for atomic displacement. The basic results are evaluated numerically for a wide range of cases which cover most situations of interest in radiation damage experiments. Numerical results are also given for the specific examples of carbon and rhodium impurities in platinum which show that in these cases the number of indirect displacements produced by knock-on impurities is negligible for most purposes. (Author)

AD-615 598 Div. 20/6, 14/6
CFSTI Prices: HC$3.00 MF$0.75

Radiation Research Associates, Inc., Forth Worth, Tex.
DIFFERENTIAL DOSE ALBEDOS FOR CALCULATION OF GAMMA-RAY REFLECTION FROM CONCRETE,
by M. B. Wells. 30 Dec 64, 55p
Rept. no. RRA-T46

Unclassified report

Descriptors: (*Concrete, Gamma-ray scattering), (*Gamma-ray scattering, Concrete), Albedo, Gamma rays, Dose rate, Monte Carlo method.

Differential dose albedos for gamma ray reflection from concrete were derived from Monte Carlo calculations of gamma ray scattering in air and concrete for source energies of 0.6, 1, 2, 4, and 7 Mev. Curves showing the albedo for reflection in the plane of incidence are presented for given angles of incidence. At incident energies greater than 2 Mev the computed dose albedos are smaller than those reported by Raso (also based on Monte Carlo) and those given by the Chilton-Huddleston formula. However, comparisons with experimental data for Cs137 and Co60 gamma rays reported by Jones, Schofield, Haggmark, and Gurney of USNRDL, C. E. Clifford of DRCL, and Barrett and Waldman of Technical Operations, Inc., indicate that the calculated albedos for these sources agree as well with the experimental data as do calculations based either on the Chilton-Huddleston formula or Raso's Monte Carlo calculations. (Author)

AD-615 664 Div. 20/6, 12/1, 30/2
CFSTI Prices: HC$4.00 MF$0.75

Douglas Aircraft Co., Inc., Santa Monica, Calif. Missile and Space Systems Div.
CHARGE, A SPACE RADIATION SHIELDING CODE,
by J. R. Lilley and W. R. Yucker. Apr 65,
108p Rept. no. SM-46335

Unclassified report

Descriptors: (*Shielding, Space environmental conditions), (*Programming languages, Shielding), (*Protons, Shielding), (*Electrons, Shielding), Space craft, Bremsstrahlung, Secondary emission, Neutrons, Cosmic rays, Programming (Computers).

The report describes CHARGE, a FORTRAN program for the analysis of primary proton andelectron passage through plane or spherical shields containing up to 100 regions, and the attendant generation and transmission of electron-induced X-rays (bremsstrahlung) and proton-induced secondary protons and neutrons. Proton and electron analyses use a modification of the range-energy relation applied to as many as one hundred energy groups, while the bremsstrahlung transmission calculation assumes an exponential attenuation corrected by semi-empirical dose buildup factors applied individually to a similar number of gamma ray energies. Availability of several bremsstrahlung source options permit comparison of most commonly used approximations. Energy dependent removal cross sections are used to calculate secondary neutron transmission. The ambient charged particle differential spectra may be specified as varying either as a power of energy or as an exponential of energy over each of several specified energy ranges, in tabulated or functional form. The analysis used is described and results are compared to other calculations and to experiments. (Author)

AD-615 665 Div. 20/6, 12/1
CFSTI Prices: HC$3.00 MF$0.75

Douglas Aircraft Co., Inc., Santa Monica, Calif.
Missile and Space Systems Div.
RADIATION PROTECTION FOR MANNED ORBITING SPACE STATIONS,
by T. M. Jordan, E. F. Koprowski, and
R. W. Langley. Sep 64, 85p Rept. no. SM-46257

Unclassified report

Descriptors: (*Space stations, Shielding), (*Shielding, Space environmental conditions), Solar flares, Protons, Electrons, Bresstrahlung, Transport properties, Cosmic rays, Programming (Computers), Secondary emission, Materials, Aluminum, Graphics, Spheres, Manned spacecraft, Radiological dosage.

Reported are the results of a detailed parametric

investigation of radiation shielding requirements for first generation manned orbiting space stations. The radiation sources considered were: trapped protons, trapped electrons (natural and artificial) and associated bremsstrashlung, and solar flare protons. Basic shielding data is presented for the above radiation sources for spherical shield configurations. This data is included because of its general applicability to a variety of shield configurations. These results are presented for circular orbits of 100, 200, 400, and 600 nautical mile altitudes and 28.7, 45, 60, and 90 degree inclinations. In addition, data are presented for extrapolation of the presented data to other altitudes. Two specific space stations were studied. The shielding analysis was based on the actual vehicle geometry, including onboard equipment and supplies, and included self shielding effects of a typical crew member represented by two elliptical cylinders. Typical results are presented for the dose received by various critical organs for several of the circular orbits mentioned above. (Author)

19. Ordnance

AD-615 233 Div. 22/6
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
A POWERFUL EXPLOSION IN A MEDIUM WITH A DENSITY GRADIENT,
by E. I. Andriankin. 20 Apr 65, 9p
FTD-TT-64-1185
TT 65-62233 Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR, Otdelenie Tekhnicheskikh Nauk. Izvestiya n2 p123-5 1958.

Descriptors: (*Explosions, Density), Explosion gases, Shock waves, Dynamics, Mathematical analysis, USSR.

AD-615 572 Div. 22/1, 18/3
CFSTI Prices: HC$1.00 MF$0.50

Development and Proof Services, Aberdeen Proving Ground, Md.
THE DEVELOPMENT OF AN ENGINEERING TEST STANDARD COVERING THE TRANSPORTATION ENVIRONMENT OF MATERIEL,
by J. A. Tolen. Dec 63, 14p Rept. no. DPS-1190

Unclassified report

Descriptors: (*Ammunition, Environmental tests), Standards, Military requirements, Transportation, Simulation, Handling, Safety, Vibration, Logistics, Cargo vehicles, Trailers.

An agency vested with engineering test responsibility must provide certain services to the design agencies. These services include establishing, as required, standards against which items are to be tested. These test standards must provide adequate assurance that the field receives a viable and safe item, but must not provide an overtest to the extent that the designer's task is made unnecessarily difficult. The purpose of the report is to establish a suitable standard covering the simulation of the transportation environment of ammunition. (Author)

AD-615 722 Div. 22/1, 22/6, 30/2
CFSTI Prices: HC$1.00 MF$0/50

Naval Ordnance Lab., White Oak, Md.
CALCULATION OF DETONATION PARAMETERS WITH THE RUBY CODE,
by Harold Hurwitz. 31 Mar 65, 22p
NOLTR-63-205
ask RUME4E000 212 1WF008 10 004

Unclassified report

Descriptors: (*Explosive materials, Detonations), (*Detonations, Explosive materials), (*Programming languages, Detonations), TNT, PETN, RDX, Graphite, Mathematical analysis, Heat of formation, Loading, Density, Programming (Computers).

The RUBY high-speed computer code, obtained by NOL from the Lawrence Radiation Laboratory, computes the detonation parameters of a given explosive from its chemical composition and known thermodynamic data. Preliminary computations have been carried out for TNT, PETN, and RDX, to examine the applicability of RUBY to problems of interest to NOL. In these computations the loading density, heat of formation of graphite, and the number of permitted gaseous products were varied. It was found that agreement with experimental values was good enough to warrant proceeding to further computations for explosives containing carbon, hydrogen, nitrogen, and oxygen, using the conventional zero value for the heat of formation of graphite. It was also noted that within the range of loading densities studied the detonation parameters vary approximately linearly with loading density. (Author)

20. Physics

AD-615 193 Div. 25/2, 17/2

Institute for the Study of Metals, Univ. of Chicago, Ill.
SELF-DIFFUSION OF LEAD, THALLIUM AND BISMUTH IN THE SOLID LEAD-THALLIUM SYSTEM,
by H. A. Resing and N. H. Nachtrieb. 22 Mar 61, 17p
Contract AF18 600 1489
AFOSR 3425

Unclassified report

Revision of manuscript submitted 3 Aug 60.
Pub. in Journal of the Physics and Chemistry of Solids v21 nos 1/2 p40-56 1961
(Copies available only to DDC users).

Descriptors: (*Lead, Diffusion), (*Thallium, Diffusion), (*Bismuth, Diffusion), (*Lead alloys, Thallium alloys), (*Thallium alloys, Lead alloys), Solid solutions, Impurities, Phase studies, Differential equations, Crystal lattice defects.

Results are reported for the self-diffusion of both lead and thallium over the whole range of solid solution for these elements (0-87 atomic per cent Tl) for the temperature interval, 206-323 C. Data for the trace impurity diffusion of bismuth over the same concentration range are also given for a more limited temperature range. All three elements show the same qualitative dependence of their diffusion coefficient upon alloy composition: namely, a slight maximum at about 35 atomic per cent thallium and a deep minimum at about 75 atomic per cent thallium at all temperatures. The results are compared with the predictions of the corresponding states principle and with theories based upon the Johnson vacancy-solute complex mechanism. A correction applied to the corresponding states principle, based upon lattice parameter deviations from Vegard's Law, leads to agreement with observation. Some evidence for the existence of a superlattice at alloy compositions in the neighborhood of PbTl7 is inferred from trends in the ratios DsubTl/DsubPb and DsubBi/DsubPb with thallium concentration. (Author)

AD-615 209 Div. 25/2, 25/7

Lockheed Missiles and Space Co., Palo Alto, Calif.
RADIATIVE RECOMBINATION STUDIES IN PbTe AND PbSe,
by E. R. Washwell and K. F. Cuff. 1964, 11p

Unclassified report

Pub. in Mono. Congress International Recombinaison Radiative Dans Les Semiconducteurs (no. 7) Paris p11-20 1964.
(Copies available only to DDC users).

Descriptors: (*Semiconductors, Single crystals), (*Lead alloys, Intermetallic compounds), (*Band spectrum, Lead alloys), (*Selenium alloys, Lead alloys), (*Tellurium alloys, Lead alloys), Electron transition, Atomic energy levels, Electromagnetic waves, Emissitivity, Selenium alloys, Tellurium alloys.

A study was made of the photo-induced recombination radiation from single crystals of PbTe and PbSe as a function of carrier concentration and temperature. The spectra was analyzed assuming the applicability of the principle of detailed balance, using the known band parameters of these direct gap semiconductors. Previous investigations of the lead salt semiconductors (PbTe, PbSe, and PbS) have shown that the band extrema occur at the L point and that the constant energy surfaces are prolate ellipsoids with comparable mass components in both bands. The spectrum analysis shows that the observed emission is the result of a band-to-band process. The spontaneous emission spectrum consists of a single spontaneous band with considerable structure superimposed. The structure is believed to be the result of longitudinal optical (LO) phonon interactions and yields the value 0.012± 0.002 ev and 0.018 ± 0.002 ev for the LO phonon energy in PbTe and PbSe respectively. (Author)

AD-615 211 Div. 25/3, 25/5, 25/6, 25/7
CFSTI Prices: HC$6.00 MF$1.25

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
JOURNAL OF APPLIED MECHANICS AND TECHNICAL PHYSICS, 1964, NO. 1 (COLLECTION OF ARTICLES).
4 Mar 65, 236p FTD-MT-64-284
TT 65-62211

Unclassified report

Edited machine trans. of Zhurnal Prikladnoi Mekhaniki i Tekhnicheskoi Fiziki (USSR) n1 p1-137 1964.

Descriptors: (*Physics, Periodicals), (*Mechanics, Periodicals), Particle beams, Charged particles, Ion beams, Neutralization, Plasma oscillations, Kinetic theory, Diatomic molecules, Gases, Vibration, Relaxation time, Boundary layer, Group (Mathematics), Gamma rays, Shielding, Plasticity, Plasma medium, Electromagnetic waves, Propagation, Magnetic fields, Helium, Gas flow, Porous materials, Shock waves, Thermodynamics, Heat exchange, Fluid flow, Explosives, Liquids, Detonations, Burning rate, Ammonium picrate, Density, Boiling.

AD-615 213 Div. 25/4
CFSTI Prices: HC$2.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
MASERS (CHAPTERS I THRU III),
by N. G. Basov, V. S. Zuev, and K. K. Svidzinskii.
5 Apr 65, 41p FTD-MT-64-330
TT 65-62213

Unclassified report

Edited machine trans. of Akademiya Nauk SSSR. Fizicheskii Institut. Trudy v21 p176-99 1963.

Descriptors: (*Masers, Ammonia), Molecular beams, Ultrahigh frequency, Electron transitions, Hyperfine structure, Cavity resonators, Frequency stabilizers, Signal-to-noise ratio, Electron optics, USSR.

This work was provided in order to illustrate the possibility of creation of a maser by use of inversional transitions in a beam of heavy ammonia ND3. As a result of the work conducted, it is claimed that a working model of a maser on a molecular beam of ND3 was successfully contructed. Power of radiation of such a generator at frequency of 1656.18 Mc. (line J = 6, K = 6 of inversional spectrum of ND3) constitutes a magnitude of the order of 10 to the minus 11th power w. Absolute stability of frequency preliminary appraisals is of the order 10 to the minus 9th power.

AD-615 219 Div. 25/6, 25/8
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
OSCILLATION OF AN ORTHOTROPIC TAPERED SHELL IN A VARIABLE TEMPERATURE FIELD,

by S. A. Ambartsumyan and S. M. Durgaryan.
15 Apr 65, 11p FTD-TT-64-1153
TT 65-62219

Unclassified report

Unedited rough draft trans. of Akademiya Nauk Armyanskoi SSR, Erevan. Doklady v38 n2 p87-92 1964.

Descriptors: (*Elastic shells, Oscillation), (*Thermal stresses, Elastic shells), (*Oscillation, Elastic shells), Slender bodies, Deformation, Partial differential equations, Stresses, Temperature, USSR.

The problem is considered of the so-called free oscillations of a very tapered orthotropic shell of positive Gaussian curvature and thickness h taking place in the field of action of high temperatures. It is assumed that the shell is referred to the orthogonal curvilinear system of coordinates, the material of the shell is subject to Hooke's generalized law, and at each point there are three planes of elastic symmetry which are parallel to the coordinate surfaces.

AD-615 231 Div. 25/2
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
DISLOCATIONS IN ION CRYSTALS,
by V. L. Indenbom. 20 Apr 65, 24p FTD-TT-64-1183
TT 65-62231

Unclassified report

Unedited rough draft trans. of mono. Fizika Shchelochnogaloidnykh Kristallov (Physics of Alkali Halide Crystals), Riga, 1962 p439-52 (Vsesoyuznyi Soveshchanie (no. 2) Riga, 19-24 Jun 61 Trudy).

Descriptors: (*Crystal lattice defects, Scientific research), Metallic crystals, Halides, Alkali metal compounds, Crystals, Theory, Anisotropy, Crystal structure, Stresses, Ions, Plasticity, USSR.

Topics include: experimental methods of studying dislocations; geometry of dislocations and plastic anisotropy of ion crystals; dislocations and real structure of crystals, internal stresses, plasticity, and destruction.

AD-615 236 Div. 09/1, 26/8
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
RESISTANCE CRISIS OF THE DIFFUSER,
by A. I. Lashkov. 21 Apr 65, 10p
FTD-TT-64-1202
TT 65-62236

Unclassified report

Unedited rough draft trans. of Inzhenernyi Zhurnal (USSR) v2 n2 p365-8 1962.

Descriptors: (*Diffusers, Fluid dynamic properties), Physical properties, Effectiveness, USSR.

The character of the change in the dependence of the resistance of the diffusers with great angles of opening on the Re number is brought about by the same principles as for the bodies around which flow is difficult. In the diffuser with a great angle of opening there is possible the realization of a system of flow which is characterized by a crisis of resistance. The relative roughness of the walls in the region of the input flow for the diffuser with great angles of opening proves to be an unavoidable criterion of similarity. (Author)

AD-615 237 Div. 25/2, 17/7
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON DEFECTS IN CRYSTALLINE LATTICE ORIGINATING DURING THE PROCESS OF HARDENING OF SILVER HEATED IN AIR,
by T. D. Ositinska, V. O. Pervakov, and V. G. Khotkevich. 21 Apr 65, 9p FTD-TT-64-1211
TT 65-62237

Unclassified report

Unedited rough draft trans. of Ukrayinskyi Fizychnyi Zhurnal (USSR) v8 n8 p921-4 1963.

Descriptors: (*Silver, Crystal lattice defects), (*Crystal lattice defects, Silver), Hardening, Heating, Air, Heat treatment, Resistance (Electrical), Oxygen.

A series of measurements were made to evaluate the contributions caused by vacancy type defects and the increment in electrical resistance during the hardening of silver by heating in air. And also to select the annealing condition, which allows the removal of the basic mass of these defects from the metal leaving in it mostly the dissolved oxygen. The obtained data offers also certain additional information about the mobility of oxygen atoms at temperature close to room temperature.

AD-615 253 Div. 25/1
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
METHOD OF SIMULATING ACOUSTIC PROCESSES IN ENCLOSED SPACES,
by B. G. Belkin. 29 Apr 65, 7p
FTD-TT-64-1294
TT 65-62253

Unclassified report

Unedited rough draft trans. of Russian Patent 161527, pub. 10 Apr 63, appl. 830 212/26-10.

Descriptors: (*Acoustic, Simulation), Sound signals, Sound transmission, Sound reproduction systems, Ultrasonic radiation, Patents, Supersonic characteristics, USSR.

The object of the invention is a method of simulating acoustic processes in enclosed spaces with the aid of supersonic signals emitted and received in a reduced model of an investigated space which is distinguished by the fact that for the purpose of narrowing the frequency range a signal of low frequency subjected to conversion into supersonic is separated into two components, a low-frequency and a high-frequency one is changed into supersonics by the transposition of the spectrum upwards in accordance with the scale of the model through the recording of it on a magnetic tape, and the high-frequency component by means of amplitude modulation by it of sinusoidal oscillation of some high frequency and subsequent separating and emission in the model of one lateral band of modulated oscillation. The method is distinguished by the fact that for the purpose of synchronization of the low-frequency and high-frequency components of a signal passing through the model the low- and high-frequency components of the signal are preliminarily recorded on separate tracks of one tape or a multichannel magnetic-tape recorder and afterwards reproduced in turn in such a way that the low-frequency component, at the properly increased speed, and the signals received in the reproduction in turn of the low-frequency and high-frequency components are recorded on another track of the same magnetic tape. (Author)

AD-615 269 Div. 25/6
CFSTI Prices: HC$2.00 MF$0.50

Harry Diamond Labs., Washington, D. C.
MECHANISM OF HIGH CONDUCTIVITY IN VACUUM-DEPOSITED CADMIUM SULFIDE FILMS,
by D. W. Readey. 2 Mar 65, 45p Rept. no. TR-1280
Projs. 96300, 1P523801A300
Unclassified report

Descriptors: (*Semiconducting films, Electrical conductance), (*Cadmium compounds, Sulfides), Vapor plating, Vacuum apparatus, Heat treatment, Diffusion Atomic energy levels, Crystal lattices, X-ray diffraction analysis, Dynamics.

Cadmium sulfide thin films are of interest for various electronic device applications. Films deposited on cold substrates have high conductivities unsuitable for device utilization and must be heat-treated to improve their properties. This investigation was therefore concerned with the high conductivity and phenomena resulting from heat-treatment to elucidate the mechanism that gives rise to them. Based on kinetic measurements made during heat-treatment and other experiments, it is concluded that the high conductivity is caused by a nonstoichiometric excess of cadmium in the films. During heat-treatment, the excess cadmium diffuses to the film surface where it evaporates, with diffusion being the rate-controlling mechanism. Also, the as-deposited films contain a number of electron trapping sites, most of which are annealed out during heat treatment. (Author)

AD-615 279 Div. 25/6, 25/1
CFSTI Prices: HC$2.00 MF$0.50

Boeing Scientific Research Labs., Seattle, Wash.
VIBRATING SYSTEMS AND FUNCTIONAL ANALYSIS. I. TYPICAL VIBRATING SYSTEMS. II. GENERAL THEORY,
by Bernard Friedman. Feb 65, 37p
Mathematical note no. MN-388, D1-82-0407
Unclassified report

Also available from the author.
Prepared in cooperation with California Univ., Berkeley.

Descriptors: (*Vibration, Functional analysis), (*Functional analysis, Vibration), Theory, Operators (Mathematics).

AD-615 281 Div. 01/3, 15/1
CFSTI Prices: HC$3.00 MF$0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ANALYTICAL AND EXPERIMENTAL DETERMINATION OF THE NATURAL FREQUENCIES AND MODE SHAPES OF SKEW PLATES.
Master's thesis,
by Keete Lockett Hester. Mar 65, 100p
Rept. no. GAM/Mech/65A-2
Unclassified report

Descriptors: (*Flat plate models, Vibration), (*Harmonic analysis, Flat plate models), Sheets, Matrix algebra, Aeroelasticity, Elastic shells, Rectangular bodies, Numerical methods and procedures, Structures.

The accuracies of equivalent mass matrices for a triangular and rectangular element based on linearly varying static displacements were tested in natural frequency and mode shapes calculations for a simply supported square plate. Accuracies for the fundamental frequency of a nine degree-of-freedom plate were found within 10%. A lumped mass matrix resulted in an accuracy within 0.5%. The lumped mass and triangular element mass matrix were extended to frequency calculations for 60, 45, and 30 degree simply supported skew plates, each with aspect ratios of 1, 1/2, and 1/3. Results were disappointing when compared to experimental frequencies. Too many inaccuracies existed in the experimental and analytical method. Photographs were taken of mode shapes. (Author)

AD-615 294 Div. 25/4
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
DEVICE FOR MULTIPLYING THE ANGLE OF REFRACTION OF A LIGHT BEAM IN REFRACTOMETRY,
by S. S. Pallei and M. A. Zhuravlev. 28 Apr 65, 5p FTD-TT-64-1288
TT 65-62267
Unclassified report

Unedited rough draft trans. of Russian patent 158 702, pub. 12 Nov 63, appl. 776 588/23-4.

Descriptors: (*Beams (Electromagnetic), Refractometers), (*Refractometers, Beams (Electromagnetic)), Refraction, Light, Patents, USSR.

The object of the invention is a device for the multiplication of the angle of refraction of a light beam in refractometry, which is distinguished by the fact that for the purpose of simplifying the design and increasing the precision of the measurements it is built in the form of an elastic suspension, with a reflector fastened on it, and consists of two parts of different section, the end with the lesser section of which is connected with a shaft with a scale and reversing motor, and the end with the greater section being fastened to the movable support with scales. (Author)

AD-615 305 Div. 25/6, 25/2
CFSTI Prices: HC$2.00 MF$0.50

Aerospace Research Labs., Office of Aerospace Research, Wright-Patterson AFB, Ohio.
ELECTRON RADIATION DAMAGE IN ZnSe AT LOW TEMPERATURE,
by B. A. Kulp and R. M. Detweiler. Mar 65, 36p
ARL 65-60
Proj. 7885, Task 788501
Unclassified report

Descriptors: (*Semiconductors, Electron bombardment), (*Zinc alloys, Selenium alloys), (*Crystal lattice defects, Semiconductors), Low-temperature research, Fluorescence, Impurities, Heat of activation, Heat treatment, Band spectrum.

A threshold for radiation damage in ZnSe has been previously reported at 240 keV under electron bombardment. Fluorescence bands at 5460 and 5850 A are produced. The damage causing these fluorescence bands anneals completely in a single stage at about 130K. At 10K somewhat different fluorescence bands are produced. Following heat treatment aboove 90K the fluorescence spectrum produced by the 10K bombardment anneals into that produced by the 80K bombardment. This indicates that at least one and possibly more of the fluorescence centers observed following bombardment at 80K is a 'complex' center. That is, it is composed of a defect of Zn or Se in association with a foreign impurity. A second threshold for radiation damage in ZnSe has been observed while bombarding at 10K. This threshold is at 190 keV and is believed to be that for displacement of the Zn atom from the lattice. The 240 keV threshold is therefore

associated with displacement of the selenium atom. The displacement energies are 7.6 eV for the zinc and 8.2 eV for the selenium atom. These values are compared to 7.3 eV and 8.7 eV for the cadmium atom and sulfur atom previously measured in CdS. (Author)

AD-615 307 Div. 25/4
CFSTI Prices: HC$2.00 MF$0.50

Naval Research Lab., Washington, D. C.
LASER MATERIALS RESEARCH.
Progress rept. for 1 Jul-15 Dec 63,
Dec 63, 45p Memo rept. no. NRL-MR-1483
ARPA Order 306
Unclassified report

Descriptors: (*Lasers, Materials), (*Materials, Lasers), Ruby, Synthetic stones, Glass, Gadolinium, Europium, Flash lamps, Pumping (Electronics), Intensity, Absorption spectrum, Atomic energy levels, Optical properties, Ytterbium.

The report summarizes the progress made from 1 July 1963 to 15 December 1963. During this period work was carried out on the following: evaluation of the optical quality of synthetic rubies, investigation of the 2E levels of ruby, the optical absorption spectrum of ruby, investigation of excited-state absorption in gadolinium-activated glass, spectroscopy of ytterbium-activated laser glass, the synthesis of laser glasses, particularly of gadolinium and europium activated glasses, investigation of the light emission produced by double-pulsing of flash lamps, continued studies on optical pumping using exploding wire light sources, fundamental investigations of pumping light sources, and observations of effects due to high intensity laser beams.

AD-615 316 Div. 08/6, 08/7
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
ANALYTIC EVALUATION OF THE FOURIER COEFFICIENTS OF A CLIPPED PERIODIC FUNCTION,
by Marvin Blum. May 65, 41p Rept. no. P-3137
Unclassified report

Descriptors: (*Fourier analysis, Wave transmission), (*Wave transmission, Fourier analysis), Signals, Broadband, Sidebands, Series, Integral transforms, Communication theory.

For periodic input u(t), a time representation c(t) for the clipper is obtained such that the output y(t) = c(t) u(t). The Fourier coefficients of y(t) are obtained in terms of the Fourier coefficients of both c(t) and u(t). For light clipping, the Fourier coefficients of y(t) equal the Fourier coefficients of u(t) plus a small correction factor of the order of the per cent of time the signal exceeds clipping limits. An exact expression for the correction factor is obtained which may require numerical solutions. Some algorithms for obtaining numerical solutions are discussed. (Author)

AD-615 320 Div. 25/5, 15/1, 25/4
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
SOME MATHEMATICAL ASPECTS OF MULTIPLE SCATTERING IN A FINITE INHOMOGENEOUS SLAB WITH ANISOTROPIC SCATTERING.
Memo.,
by S. Ueno, R. E. Kalaba, H. H. Kagiwada, and R. E. Bellman. May 65, 22p Rept. no. RM-4595-PR
Contract AF49 638 700 Unclassified report

Descriptors: (*Photons, Scattering), Quantum mechanics, Diffusion, Light, Differential equations, Integral equations, Probability, Quantum statistics, Reflection.

The problem of radiative transfer in a finite inhomogeneous slab with anisotropic scattering is discussed. Some integro-differential equations with initial conditions are derived for the internal intensity, the source function, and the probability of photon emergence, with the aid of the invariant imbedding technique. These new equations are suitable for numerical computation with a large digital computer. (Author)

AD-615 322 Div. 25/6
CFSTI Prices: HC$2.00 MF$0.50

Brown Univ., Providence, R. I. Div. of Applied Mathematics.
VARIATIONAL PRINCIPLES IN THE LINEAR DYNAMIC THEORY OF VISCOELASTICITY,
by Marshall J. Leitman. Apr 65, 26p
Technical rept. no. TR-98
Contract Nonr56210, Proj. NR064 406
Unclassified report

Descriptors: (*Viscoelasticity, Theory), Calculus of variation, Dynamics, Linear systems.

In a recent paper, Gurtin deduces variational principles which characterize the standard initial-value problems of linear elastodynamics. This paper extends these principles to dynamic viscoelasticity theory. (Author)

AD-615 335 Div. 25/4
CFSTI Prices: HC$1.00 MF$0.50

Philco Research Labs., Newport Beach, Calif.
LASER PUMPING SOURCES.
Final technical rept., add.,
by S. Byron and W. Lawrence. 30 Apr 65, 13p
Pub. no. U-3104
Contract Nonr423700, Proj. 3730, ARPA Order 306 62
Unclassified report

Descriptors: (*Lasers, Pumping (Electronics)), Shock tubes, Quenching (Inhibition), Pyrotechnics, Energy conversion, Glass, Ruby.

The use of shock tube radiation sources as a laser pumping source was explored. Two side pumping configurations were fabricated and were used in attempts to pump a Nd doped glass rod and ruby rods, 2 in. long by 1/4 in. diameter. The glass rod, having an electrical threshold of 80 joules produced strong laser oscillation when pumped by the shock tube source. However no laser output was produced from the ruby rods. Since the spectral studies indicated that the shock tube radiation source provides sufficient intensity and duration to pump ruby above threshold, several suspected difficulties were explored. The UV transmission of the thermal setting plastic used to encapsulate the rubies was measured and found to cut off at a wavelength of 3300A, thus ruling out removal of the upper laser levels by UV pumping below 3000A as a possible explanation. On the other hand a marked increase in the threshold of ruby was observed when it was pumped only from one side. This is currently thought to be the cause of the difficulty found in using the linear shock tube to pump ruby crystals.

AD-615 351 Div. 25/2, 25/3, 25/6

Maryland Univ., College Park.
CORRELATION EFFECTS AND THE HELICON

DISPERSION RELATION,
by R. E. Prange. 4 Sep 64, 2p
Grant AF AFOSR62 46
AFOSR 65-0740

Unclassified report

Pub. in Physics Letters v12 n3 p1181-2 Oct 1 1964 (Copies available only to DDC users).

Descriptors: (*Metals, Electrons), (*Electrons, Phonons), Scattering, Electrostatic fields, Hamiltonian, Metallic crystals, Light, Polarization.

AD-615 352 Div. 20/2, 02/1

Harvard Coll., Cambridge, Mass. Observatory.
NUCLEAR INTERACTIONS OF COSMIC RAYS AS THE SOURCE OF THE SYNCHROTRON RADIATING PARTICLES OF OUR GALAXY.
Revised ed.,
by J. B. Pollack and G. G. Fazio. 24 Aug 64, 15p

Unclassified report

Pub. in Astrophysical Journal v141 n2 p730-44 Feb 15 1965 (Copies not available to DDC or Clearinghouse customers)
Revision of manuscript submitted 28 Oct 63.

Descriptors: (*Nuclear reactions, Cosmic rays), (*Cosmic rays, Elementary particles), (*Interstellar matter, Cosmic rays), Positrons, Electrons, Relativity theory, Galaxies, Extraterrestrial radio waves, Noise (Radio), Magnetic fields.

A detailed analysis is presented of the production of secondary electrons and positrons in our galactic disk by cosmic radiation. The calculations employ data from high-energy nuclear physics experiments. The object of this analysis is to determine how well these particles can explain the spectrum and intensity of the meter-wavelength radio noise from the halo and disk of our Galaxy. The calculated spectrum and intensity do not agree exactly with the measured values, but are very useful in trying to understand the existing situation with respect to high-energy particles in the Galaxy. Independent of the origin of the synchrotron-radiating particles, the complete diffusion of relativistic cosmic-ray electrons and positrons throughout the Galaxy is demonstrated, and information on the magnetic-field intensity in the disk and halo is obtained. Methods by which the secondary origin of the synchrotron radiating particles can be tested are examined, and in particular the positron-to-electron ratio in cosmic rays is predicted as a function of energy. (Author)

AD-615 353 Div. 09/4, 31/5

Hydrodynamics Lab., Calif. Inst. of Tech., Pasadena.
SOME RECENT DEVELOPMENTS IN PROPELLER THEORY,
by T. Yao-tsu Wu. Feb 65, 14p Rept. no. E-97-6
Contract Nonr22035

Unclassified report

Pub. in Schiffstechnik (West Germany) v12 n60 p1-12 Feb 1965 (Copies available only to DDC users).

Descriptors: (*Propellers (Marine), Theory), Reviews, Hydrodynamics, West Germany.

AD-615 364 Div. 25/3, 08/6

National Magnet Lab., Mass. Inst. of Tech., Cambridge.
ALFVÉN-WAVE PROPAGATION IN PYROLYTIC AND SINGLE-CRYSTAL GRAPHITE,
by M. Surma, J. K. Furdyna, and H. C. Praddaude.
22 Oct 64, 3p
Contract AF49 638 1468
AFOSR 65-0606

Unclassified report

Pub. in Physical Review Letters v13 n24 p710-712 Dec 14 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Graphite, Magnetohydrodynamics), (*Magnetohydrodynamics, Graphite), Propagation, Pyrolytic graphite, Single crystals, Magnet fields, Wave transmission, Cryogenics, Anisotropy, Microwaves, Absorption, Plasma medium.

An investigation was made of the phenomenon in pyrolytic graphite (PG), which afforded the possibility of investigating the unique behavior of Alfvén waves in an almost two-dimensional plasma. The experiments were carried out at 4.2K with a 35-Gc/sec absorption cavity spectrometer. The results are in good agreement with the anisotropy of the Fermi surface of graphite. The carrier density, estimated on the basis of these measurements using Shubnikov-de Haas effective masses for the basal plane, is 3.3 x 10 to the 24th power/cu m for each carrier.

AD-615 368 Div. 25/3, 15/1
CFSTI Prices: HC$3.00 MF$0.75

Michigan Univ., Ann Arbor. Coll. of Engineering.
SURFACE FIELD COMPONENTS FOR A PERFECTLY CONDUCTING SPHERE,
by John A. Ducmanis and Valdis V. Liepa. Mar 65, 94p Scientific rept. no. SR-3, 5548-3-T
Contract AF19 628 2374, Proj. 5635, Task 563502
AFCRL 65-184

Unclassified report

Descriptors: (*Spheres, Electromagnetic fields), (*Electromagnetic fields, Surfaces), (*Electromagnetic waves, Scattering), Field theory, Integral equations, Series, Electric currents, Surface properties.

For a plane wave incident on a perfectly conducting sphere of radius a, the surface field components are expressible in terms of series of the Mie type. These have been evaluated on an IBM 7090 computer and results are presented for theta = 0(5)180 deg, where theta denotes the angular position on the surface, and ka =0.1(0.1)5.0(0.2)10.0, where k is the propagation constant. (Author)

AD-615 370 Div. 25/6, 25/2
CFSTI Prices: HC$2.00 MF$0.50

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
MAGNETIC ANNEAL EFFECTS IN SOME GARNETS,
by Robert P. Hunt. Apr 65, 46p
Technical rept. no. TR-199
Contracts Nonr184110, AF19 604 5482,
Proj. NR018 801

Unclassified report

Descriptors: (*Garnets, Magnetic properties), (*Ferromagnetic materials, Anisotropy), Yttrium compounds, Iron compounds, Impurities, Silicon, Diffusion, Single crystals, Crystals, Low-temperature research, Heat treatment, Kinetics, Hysteresis, Lutetium compounds, Heat of activation, Relaxation time.

Many properties of polycrystalline and reduced single

crystal yttrium iron garnet (YIG) have been attributed to the presence of Fe(2+) ions which provide mobile electrons that can diffuse locally through the lattice. This electron-diffusion process was studied by means of several low-temperature torque experiments on silicon-doped YIG of the form Y3Fe(5-delta)Si delta with 0 < delta < 0.18. Silicon-doped YIG, which contains mobile electrons, shows an induced anisotropy proportional to the doping when magnetically annealed at low temperatures. The kinetics and temperature dependence of this anisotropy were investigated. The garnet also demonstrates a constant high field component of rotational hysteresis which is both temperature and frequency dependent. The intrinsic, unannealed anisotropy behaves in a novel way. At room temperature it coincides with that of normal YIG, but between 150 and 300K (K sub 1) increases above that of pure YIG. Below about 150K the curves develop asymmetry and are no longer cubic. At 4.2K the easy axis has shifted to the (100) direction in the case of 3% doping. (Author)

AD-615 379 Div. 25/4, 25/6

Naval Ordnance Test Station, China Lake, Calif.
EFFECT OF A THIN SURFACE FILM ON THE ELLIPSOMETRIC DETERMINATION OF OPTICAL CONSTANTS,
by D. K. Burge and H. E. Bennett. 15 Jun 64, 8p
NOTS-TP-3774
NAVWEPS 8723

Unclassified report

Pub. in Journal of the Optical Society of America v54 n12 p1428-33 Dec 1964
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Optical properties, Determination), (*Metal films, Optical phenomena), Oxides, Surface properties, Semiconducting films, Ellipsoids.

The thin oxide film present on most metals and semiconductors is difficult to detect and, if uncorrected for, can cause serious errors in the ellipsometric determination of optical constants. The reflectance at normal incidence calculated from these incorrect optical constants will, in general, be higher than that measured experimentally for a film-covered sample. A comparison of the approximate, linear, thin-film relations of Drude and Archer with the exact equations shows that the Drude relations are more inaccurate than are usually reported; in some cases serious errors result for films as thin as 10 A. Archer's relations are more accurate than Drude's in most cases. However, if either of these sets of relations is used to correct measured ellipsometric values to the no-film condition, considerable errors in determining the optical constants may occur even if the film thickness is known.

AD-615 380 Div. 25/4, 14/6

Naval Ordnance Test Station, China Lake, Calif.
TRANSMITTANCE OF IRTRAN-1, MAGNESIUM FLUORIDE AND IRRADIATED MAGNESIUM FLUORIDE,
by Allen L. Olsen, Marian E. Hills, and William R. McBride. Feb 65, 6p NOTS-TP-3759
Task R360FR106 216 1R0111 01 001
NAVWEPS 8714

Unclassified report

Pub. in Optical Society of America. Journal v53 n8 p1003-5 Aug 1963 and Journal of Chemical Physics v40 n7 p2053-4 Apr 1 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Optical materials, Wave transmission), (*Magnesium compounds, Fluorides), Infrared radiation, Ultraviolet radiation, X rays, Single crystals, Absorption, Measurement.

Transmittance measurements were made in the region 0.2 to 15 microns on hot-pressed magnesium fluoride, known commercially as IRTRAN-1, and on single-crystal magnesium fluoride. The IRTRAN-1 had several absorption bands in the infrared and its transmittance decreased continuously from the infrared to the ultraviolet, where the transmittance was essentially zero. Single-crystal magnesium fluoride possessed good transmissivity from the beginning of the ultraviolet to the absorption edge beginning at 6 microns, with complete absence of absorption bands. Prolonged X-ray irradiation of single-crystal magnesium fluoride produced absorption bands at 255 and 370 millimicrons. Illumination of the irradiated crystals with ultraviolet light resulted in a diminution of the 255-millimicron band and an increase in the 370-millimicron band. (Author)

AD-615 383 Div. 25/4, 2/7
CFSTI Prices: HC$2.00 MF$0.50

McGill Univ., Montreal (Quebec). Stormy Weather Group.
ATTENUATION OF A PARALLEL BEAM OF LIGHT, PARTICULARLY BY SNOW,
by Olav Lillesaeter. Apr 65, 38p
Scientific rept. no. SR-2, MW-43
Contract AF19 628 2489, Proj. 6672, Task 667205
AFCRL 65-241

Unclassified report

Descriptors: (*Beams (Electromagnetic), Attenuation), (*Light transmission, Snow), (*Snow, Light transmission), Visibility, Air pollution, Meteorological phenomena, Lasers.

A pulsed light has been used in a conventional optical system with a nearly-parallel beam of light: divergence less than 0.1 degrees. Attenuation measurements over a 123 m path were made in Montreal in the early months of 1964. Attenuation by falling snow appeared to be proportional to the rate of snowfall, and is obviously proportional to distance. The value found was approximately 18(db 1/km)/(mmw 1/hr), using mmw to denote the millimetres of water to which the snow would melt. This value dropped from 18 to 10 for wet snow and snow pellets. Attenuation by rain was only 0.25(db 1/km)/(mm 1/hr). Observed visual range in snow varied inversely as the rate of snowfall, and was 1 km when the rate was 1 mmw 1/hr. Fluctuations noted in the received signal could be related to thermal eddies near the transmitter, and these are considered, along with laser possibilities, in an appendix. (Author)

AD-615 384 Div. 25/4
CFSTI Prices: HC$2.00 MF$0.50

PEK Labs., Inc., Sunnyvale, Calif.
LASER FLASH LAMP.
Final rept. for 1 Jun 63-30 Nov 64,
by G. O. Harding. 30 Nov 64, 28p
Contract Nonr412200, Proj. NR012 502

Unclassified report

See also AD-613 346.

Descriptors: (*Lasers, Pumping (Electronics)), (*Pumping (Electronics), Lasers), (*Flash lamps, Pumping (Electronics)), Light, Absorption, Gas discharges, Plasma physics, Impurities, Measurement.

A method has been described for measuring the

absorption coefficient of a gas carrying discharge currents typical of flash lamps. The absorption was obtained by comparing the radiation in two different directions from the same flash lamp, and hence, required no second flash lamp. The plasma was assumed to be uniform; Stefan's law involving the fourth power of temperature helps make this seem a reasonable approximation. In choosing a tube size, the internal dimension d should be approximately the reciprocal of the expected value of alpha for achieving the smallest probable error. The method may be of use for investigating plasmas of different origins and fields of application. The results obtained are useful for deciding whether lamps of given sizes are volume or surface radiators, and should be helpful in designing and evaluating illuminating geometries.

AD-615 386 Div. 09/4
CFSTI Prices: HC$1.00 MF$0.50

Hydrodynamics Lab., Calif. Inst. of Tech., Pasadena.
GENERAL FORMULATION OF A PERTURBATION THEORY FOR UNSTEADY CAVITY FLOWS,
by D. P. Wang and T. Yao-tsu Wu. Mar 65, 22p
Rept. no. E-97.7
Contract Nonr22035

Unclassified report

Descriptors: (*Perturbation theory, Fluid flow), (*Fluid flow, Cavitation), (*Cavitation, Fluid flow), Two-dimensional flow, Gravity, Potential theory.

The problem of a two-dimensional cavity flow of an ideal fluid with small unsteady disturbances in a gravity free field is considered. By regarding the unsteady motion as a small perturbation of an established steady cavity flow, a fundamental formulation of the problem is presented. It is shown that the unsteady disturbance generates a surface wave propagating downstream along the free cavity boundary, much in the same way as the classical gravity waves in water, only with the centrifugal acceleration owing to the curvature of the streamlines in the basic flow playing the role of an equivalent gravity effect. As a particularly simple example, the surface waves in a hollow potential vortex flow is calculated by using the present theory. (Author)

AD-615 388 Div. 25/6
CFSTI Prices: HC$3.00 MF$0.75

Mitre Corp., Bedford, Mass.
DYNAMIC STRESSES IN AN ELASTIC CYLINDRICAL LINING OF ARBITRARY THICKNESS IN AN ELASTIC MEDIUM,
by C. C. Mow and W. L. McCabe. Apr 65, 57p
Rept. no. SR-57
Contract AF33 600 39852, Proj. 607
ESD TDR-65-112

Unclassified report

Descriptors: (*Stresses, Cylindrical bodies), (*Elasticity, Cylindrical bodies), Mechanical waves, Engineering, Dynamics, Numerical analysis, Potential theory, Propagation.

Dynamic stresses in a thick-wall elastic cylinder in an infinite elastic medium during passage of plane, compressional waves are investigated. Dynamic stresses around the cylinder in the elastic medium are also determined. Numerical results for two different cylinders with ratios of outer radius to inner radius ranging from 1.05 to 1.20 are presented in a dimensionless form. It is shown that increasing thickness does not, in general, reduce stresses in the cylinder; in addition, dynamic stresses at certain wave numbers are higher than the corresponding static value. (Author)

AD-615 406 Div. 25/6
CFSTI Prices: HC$3.00 MF$0.75

Columbia Univ., New York. Dept. of Civil Engineering and Engineering Mechanics.
SHRINKAGE STRESSES IN CASE-BONDED VISCO-ELASTIC HOLLOW CYLINDER OF INFINITE LENGTH,
by A. M. Freudenthal and M. Shinozuka. Feb 61, 84p
Technical rept. no. TR-1, CU-1-61-ONR 266(78) CE
Contract Nonr26678

Unclassified report

Descriptors: (*Viscoelasticity, Cylindrical bodies), (*Stresses, Cylindrical bodies), Strain (Mechanics), Numerical analysis, Integral transforms, Engineering, Mechanics.

Stresses and strains in a thick-walled cylinder of viscoelastic material of infinite length due to homogeneous shrinkage or swelling of the material are discussed. Two models, one of which assumes a standard solid response in shear and elastic response under volumetric strain, the other standard solid response for both conditions, are employed in order to demonstrate the effect of volume viscosity. Two different (initial) Poisson's ratios are considered to find the effect of the elastic compressibility of the viscoelastic material. The first invariant of the stress tensor and a measure of triaxiality are also computed because of their assumed sensitivity with respect to crack initiation in viscoelastic materials. (Author)

AD-615 415 Div. 25/6, 14/8, 31/4
CFSTI Prices: HC$2.00 MF$0.50

Allied Research Associates, Inc., Concord, Mass.
PHOTOELASTIC INVESTIGATION OF STRESSES IN A PENETRATED HEMISPHERE.
Final rept.,
by Harold Hamilton and Herbert Becker. 21 Dec 64, 35p Rept. no. ARA-F-271-5
Contract NObs90363

Unclassified report

Descriptors: (*Photoelasticity, Pressure vessels), (*Pressure vessels, Stresses), (*Stresses, Mathematical analysis), Hemispherical shells, Plastics, Load distribution, Friction, Surface properties, Penetration, Model tests, Steel, Spheres, Pressure, Acrylic resins, Epoxy plastics, Polariscopes.

A photoelastic study was made to determine the influence of seat conditions on the stress distribution in a representative plastic window of a bathyscaphe pressure vessel. Friction measurements were made for comparison of materials and surface finishes. Two-dimensional tests established the general character of the stress distributions in the window, and three-dimensional tests revealed the stresses in a scale model of the prototype. It was found that the three-dimensional stress distribution in the region of the inner face of a plastic window, when tested in a steel sphere and loaded under external pressure, was similar to stresses in the two-dimensional models in that same region. The ratio of maximum stress to applied pressure was found to be 0.85 in the three-dimensional window model, which would also pertain to the prototype. This report includes a recapitulation of the data obtained on previous studies of the structural behavior of externally pressurized spherical vessels with window and hatch penetrations. The remaining window problems are identified and discussed, and recommendations are made for future projects. (Author)

AD-615 417 Div. 09/4
CFSTI Prices: HC$2.00 MF$0.50

Hydronautics, Inc., Laurel, Md.
EXPERIMENTS ON FREE TURBULENCE IN VISCO-ELASTIC FLUIDS,
by Jin Wu. Mar 65, 33p
Technical rept. no. TR-353-1
Contract Nonr418100, Proj. NR062 325
Unclassified report

Descriptors: (*Fluids, Visco-elasticity), (*Turbulence, Fluids), Experimental data, Transport properties, Diffusion, Drag.

In order to investigate the possible turbulence-damping characteristic of non-Newtonian fluids, the diffusion and decay of free turbulence was measured and compared on a laboratory scale by observing the spreading of a cylindrical turbulent wake in different media. Significant changes in the diffusion and decay characteristics of free turbulence in water with low concentrations of non-Newtonian additives (macromolecules) were observed. The results indicate a close correlation between effects on the decay of turbulence and the reduction of frictional resistance on smooth surfaces as observed in other experiments. (Author)

AD-615 422 Div. 25/4
CFSTI Prices: HC$3.00 MF$0.75

New Mexico State Univ., University Park.
VARIATION OF REFRACTIVE INDEX DURING LASER OPERATION.
Semi-annual technical rept. no. 3, Jul 64-Apr 65,
by Jerald R. Izatt, Harold A. Daw, and Robert C. Mitchell. Apr 65, 60p
Contract Nonr353104
Unclassified report

See also AD-603 450.

Descriptors: (*Refractive index, Lasers), (*Lasers, Refractive index), Ruby, Temperature, Optical properties, Scanning, Pumping (Electronics), Spectroscopy, Cryogenics, Low temperature research.

High-resolution measurements have been made of the anomalous dispersion associated with the two Stark components of the R sub 1 absorption line in ruby. These preliminary measurements suggest that the R sub 1 dispersion obeys the Kronig-Kramers relations; however, it is superposed on a background which is itself anomalous because the refractive index increases with increasing wavelength. These measurements cover a wavelength interval of about 0.5 A, and the change in background index is of the order of 0.001 while the R sub 1 dispersion curve deviates from the background value by about 0.0001 at the maximum. A second surprising feature of the measurements is the observation that coherent radiation from a ruby laser, which was used to illuminate the ruby sample, is absorbed less in traversing the sample than would be expected on the basis of absorption measurements made with incoherent light. Highly accurate measurements have been made of the temperature dependence of the ruby laser emission between 63K and 116K and in a second interval between 196K and 207K. Light shielding is described which has been designed and tested to minimize pump light and ruby fluorescence at the detector in experiments with the sample optically pumped. (Author)

AD-615 435 Div. 25/4, 25/2, 25/6
CFSTI Prices: HC$2.00 MF$0.50

Illinois Univ., Urbana. Engineering Experiment Station.
JUNCTION EFFECTS IN COMPOUND SEMICONDUCTORS,
by N. Holonyak, Jr., M. D. Sirkis, C. J. Nuese, and C. M. Wolfe. Dec 64, 26p Scientific rept. no. SR-1
Contract AF19 628 4337, Proj. 4608, Task 460805
AFCRL 65-93
Unclassified report

Descriptors: (*Lasers, Semiconductors), (*Diodes (Semiconductor), Lasers), Electrical properties, Optical properties, Gallium alloys, Arsenic alloys, Phosphides, Crystal growth, Single crystals, Pumping (Electronics), Electron bombardment, Luminescence, Cryogenics.

Progress which has been achieved in the synthesis of laser-quality Ga(As1-xPx) is reviewed. The method of synthesis and the structural, defect, and dislocation properties of the material are discussed. The general procedure for evaluation Ga(As1-xPx) in laser diodes is reviewed. Laser junctions in Ga(As1-xPx) with x=0.33 and threshold currents near 3000 A/sq cm at 77K are described. Apparatus for and experiments involving electron beam bombardment of III-V and II-VI semiconductor samples are described. The possibility of using this method to study recombination radiation in semiconductors in which currently junctions cannot be fabricated is discussed. An electron beam bombardment experiment which shows unambiguously that recombination radiation in Ga(As1-xPx) junctions originates on the p-type side of the junction is described. (Author)

AD-615 440 Div. 25/4
CFSTI Prices: HC$1.00 MF$0.50

National Univ., of Ireland, Dublin.
THIN ELASTIC PLATES AND SHELLS, PILE GROUPS, MAGNETIC FILMS AND NON-LINEAR BENDING.
Final scientific rept. for 1 Dec 62-30 Nov 64,
by Patrick M. Quinlan. 15 Mar 65, 9p
Grant AF EOAR63 21
AFOSR 65-0738
Unclassified report

Descriptors: (*Boundary value problems, Elastic shells), Metal plates, Rectangular bodies, Films, Magnetic properties, Deflection, Torque.

AD-615 450 Div. 25/4
CFSTI Prices: HC$1.00 MF$0.50

Naval Research Lab., Washington, D. C.
LASER RESEARCH.
Progress rept. for 30 Jun 64-1 Jan 65,
by J. W. Tucker, J. N. Bradford, and R. C. Eckardt. Apr 65, 22p Memo rept. no. NRL-MR-1604
ARPA Order 306 62
Unclassified report

Descriptors: (*Lasers, Materials), (*Ruby, Lasers), Pumping (Electronics), Optical analysis, Optical properties, Cryogenics, Gain, Lanthanum compounds, Fluorides.

Recent laser work of the Optics Division, Naval Research Laboratory is reviewed. The major topics covered include the effect of pumping on ruby quality, optical examination of lanthanum fluoride, testing of large ruby laser rods, dc operation of the AH6 mercury tube, hologram experiments, fast Q-switching, and magnetic Q-spoiling experiments. (Author)

AD-615 453 Div. 25/6, 26/1
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
DEPENDENCE OF STRESS CONCENTRATIONS ON THE QUALITY OF MACHINING DETAIL SURFACES,
by V. A. Palmov. 5 Apr 65, 14p FTD-TT-64-1080
TT 65-62290

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Izvestiya. Mekhanika i Mashinostroenie n5 p60-6 1963. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Stresses, Failure (Mechanics), (*Machining, Stresses), (*Surfaces, Structural parts), Statistical functions, Statics, Metals.

The report considers the rough machined surface as a realization of a random field with known static characteristics. The static characteristics of stresses are found by the method of random functions. The coefficient of stress concentrations is also determined.

AD-615 460 Div. 25/3
CFSTI Prices: HC$1.00 MF$0.50

Minnesota Univ., Minneapolis.
THEORETICAL RESEARCH ON THE DYNAMICS OF PLASMA RINGS.
Final rept. for 15 Feb 61-19 Aug 64,
by T. S. Lundgren and C. W. Chu. Jan 65, 13p
Contract AF33 616 7877, Proj. 7071, Task 70437
ARL 65-12

Unclassified report

Descriptors: (*Plasma sheath, Dynamics), Plasma medium, Motion, Magnetic pinch, Partial differential equations.

Five related papers are summarized. They are each concerned with some aspects of the large-scale motion of a current-carrying filament of plasma under the action of external and self-magnetic fields. (Author)

AD-615 462 Div. 25/3, 09/1, 25/8, 30/3
CFSTI Prices: HC$3.00 MF$0.75

Jet Propulsion Center, Purdue Univ., Lafayette, Ind.
AN INVESTIGATION ON THE ENERGY TRANSFER IN A TUBE ARC HEATER. PART II.
Final rept.,
by David J. Norton and S. N. B. Murthy. Mar 65, 85p
Contract AF33 657 10933, Proj. 7063, Task 7063 01
ARL 65-54

Unclassified report

Descriptors: (*Electric arcs, Plasma physics), (*Plasma medium, Transport properties), (*Heaters, Electric arcs), Gas flow, Helium, Enthalpy, Thermodynamics, Laminar flow, Programming (Computers), Differential equations.

Information was developed for designing tube-arc heaters that operate in the inlet flow regime. A simplified analysis is presented for estimating the performance of a tube arc under prescribed inlet conditions and power input level. It is assumed that the mass flux distribution in the flow is essentially constant along the tube, but it is taken into account that the radial shift of the streamlines is due to energy transfer. The gas flowing through the tube arc is assumed to have the same thermodynamic and transport properties as helium. The computer program is described for an IBM 7090 digital computer, for solving (numerically) the governing equations so that the enthalpy profiles, the velocity profiles, and the electric field can be determined for given input conditions of ampere level, tube geometry, and mass flux distribution. The results are presented in the form of design charts for constant area tube-arcs operating over different ranges of the aforementioned variables. (Author)

AD-615 465 Div. 08/6, 02/7

Department of Scientific and Industrial Research, Wellington (New Zealand). Physics and Engineering Lab.
ON VARIATIONS IN THE PHASE VELOCITY OF VERY LOW FREQUENCY SIGNALS OBSERVED IN NEW ZEALAND.
Final rept.,
by D. D. Crombie, A. H. Allan, and G. J. Burtt.
6 Jan 65, 34p
Contract AF64 500 8, Proj. 5630, Task 56301
AFCRL 65-264

Unclassified report

Available only for reference use at DDC Field Services. Copy is not available for public sale.

Descriptors: (*Very low frequency, Phase shift), (*Phase shift, Radio interference), (*Radio signals, Phase shift), New Zealand, Diurnal variations, Solar eclipses, Whistlers, Ionospheric propagation, Waveguides.

Observations of changes in the phase delay of VLF signals from GBR, NBA and NPG have been made in New Zealand. The phase reference signal is provided by Essen ring oscillators of high stability. The observed changes in phase delay due to diurnal variation of path illumination, interference between signals received over both the long and short great circle paths, interference between two or more modes propagating in the same direction, a solar eclipse, and interference between signals propagating simultaneously in the earth-ionosphere wave-guide and in magneto-ionic whistler ducts are described and discussed. (Author)

AD-615 468 Div. 09/4
CFSTI Prices: HC$2.00 MF$0.50

Michigan Univ., Ann Arbor. Coll. of Engineering.
GAS BUBBLE ENTRAINMENT IN WATER AND MERCURY VERSUS GAS CONTENT.
Internal rept. no. 6,
by M. J. Robinson and F. G. Hammitt. Jan 65, 35p
Rept. no. 06110-6-I

Unclassified report

Prepared for Atomics International, Canoga Park, Calif.

Descriptors: (*Cavitation, Flow visualization), Fluid flow, Bubbles, Gases, Distribution, Water, Mercury, Photographs, Venturi tubes, Physical properties.

An experiment is described involving photographs of flow of water and mercury with entrained gas to obtain data on visible bubble sizes and visible gas content for known loop operating parameters and known total gas content. From a comparison of the estimated visible gas content and the known total gas content conclusions are drawn regarding the distribution between dissolved and entrained gas. Conclusions are also presented regarding smallest visible bubble sizes, average mean observed sizes in both fluids, and homogeneity of the gas distribution in the fluids. (Author)

AD-615 481 Div. 09/4, 31/5
CFSTI Prices: HC$2.00 MF$0.50

Technische Hogeschool, Delft (Netherlands). Shipbuilding Lab.
THE DISTRIBUTION OF THE HYDRODYNAMIC FORCES ON A HEAVING AND PITCHING SHIPMODEL, WITH ZERO FORWARD SPEED IN STILL WATER,
by Ir J. Gerritsma and W. Beukelman. Feb 65, 26p Pub-124
Contract N62558 4097
Unclassified report

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Descriptors: (*Hydrodynamics, Ship models), (*Ship models, Hydrodynamics), Pitch (Motion), Motion, Distribution.

As an extension of earlier work on the distribution of the hydrodynamic forces, acting on a heaving and pitching shipmodel, this report deals with the case of zero forward speed. Forced oscillation tests were carried out with a segmented shipmodel to investigate the distribution of the forces along the hull for heaving and pitching motions. The in-phase and quadrature components of the vertical forces on each of the seven sections were measured as a function of frequency and an analysis was made of their distribution along the length of the shipmodel. The experimental results are compared with Grim's values for damping and added mass. The comparison shows a satisfactory agreement between theory and experiment. (Author)

AD-615 499 Div. 09/4
CFSTI Prices: HC$2.00 MF$0.50

Michigan Univ., Ann Arbor. Dept. of Nuclear Engineering.
DAMAGE TO SOLIDS CAUSED BY CAVITATION,
by Frederick G. Hammitt. 27 May 65, 48p
Rept. no. 03424-26-I
Grants NsG39 60, NSF G22529
Unclassified report

For presentation at Royal Society Discussion on Deformation of Solids Due to Liquid Impact, London, England, May 27, 1965.

Descriptors: (*Cavitation, Damage), (*Solids, Damage), (*Venturi tubes, Damage), Bubbles, Fluid dynamic properties, Water, Mercury, Tensile properties, Stain (Mechanics), Stresses, Stainless steel, Acrylic resins.

Cavitation damage in flowing systems is discussed. Aspects considered include: single-event pitting, rate of cavitation damage, sensitivity to minor system variations, fluid velocity effects, prestressing effects, and material-fluid property damge correlations. It is shown that relatively minor changes in the flow system can create order of magnitude changes in cavitation damage rates.

AD-615 500 Div. 20/1
CFSTI Prices: HC$3.00 MF$0.75

High Energy Physics Lab., Stanford Univ., Calif.
ELECTROMAGNETIC FORM FACTORS,
by T. A. Griffy and L. I. Schiff. Feb 65, 98p
HEPL-363, ITP-155
Contracts AF49 638 1389, Nonr225 7
Unclassified report

To be published in the book, 'High Energy Physics.'

Descriptors: (*Electromagnetic fields, Elementary particles), (*Elementary particles, Electromagnetic fields), Elastic scattering, Nucleons, Electrons, Nuclear scattering.

AD-615 507 Div. 09/4, 22/13
CFSTI Prices: HC$2.00 MF$0.50

Naval Ordnance Test Station, China Lake, Calif.
FLOW NOISE INSIDE BOUNDARY LAYERS OF BUOYANCY-PROPELLED TEST VEHICLES,
by C. R. Nisewanger and F. B. Sperling.
Apr 65, 38p NOTS-TP-3511
Task RUTO3H113 216 1F008 03 001
NAVWEPS 8519
Unclassified report

Descriptors: (*Hydrodynamic configurations, Tests), Turbulent boundary layer, Laminar boundary layer, Acoustics, Statistical analysis, Torpedoes, Configuration.

Boundary-layer pressure fluctuations were measured at selected points along the surface of a free-rising buoyancy-propelled torpedo-shaped vehicle. The pressure spectra were obtained throughout the band from 200 cps to 30 kcps. The transition region was located and the cross-correlation of noise pressure and shell vibration velocity in the laminar region was determined. Space-time correlation was obtained for closely spaced transducers to show the lifetime, correlation length, and convection velocity of turbulent distrubances. The effect of finite transducer size on the measured pressure was determined. (Author)

AD-615 508 Div. 09/1, 09/4
CFSTI Prices: HC$4.00 MF$1.00

Naval Ordnance Test Station, China Lake, Calif.
THEORETICAL INVESTIGATION OF THE DYNAMIC BEHAVIOR OF THE MERCURY DAMPER.
Rept. for Sep 61-Oct 63,
by Prescott D. Crout. Nov 64, 126p NOTS-TP-3635
Tasks TRAD20 001 216 1F019 03 002, RT70 43 001 216 1F019 03 002
NAVWEPS 8611 Unclassified report

Descriptors: (*Damping, Mercury), (*Mercury, Damping), Dynamics, Hydrodynamics, Friction, Torque, Pressure, Calculus of variations, Least squares method.

The dynamic behavior of the mercury damper is investigated. Particular attention is paid to the eccentric annular mercury configuration, which is the final continuous ring phase which occurs in the operation of all mercury dampers. In this phase the damping is the poorest, and the system is closely linear. The crescent, orbroken-ring, case is also considered. During the course of the investigation the hydrodynamic problem is treated as three dimensional, and extensive use is made of a variational principle of least viscous fractional power loss, which is derived. A variational principle of least constraint is also used to advantage. Formulas for calculating the behavior of the mercury damper are obtained. (Author)

AD-615 530 Div. 25/3, 09/4
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON THE SEPARATION OF A MAGNETOHYDRODYNAMIC BOUNDARY LAYER,

by A. Tsinober, A. Shtern, and E. Shcherbinin.
5 May 65, 14p FTD-TT-65-27
TT 65-62297

Unclassified report

Unedited rough draft trans. of Akademiya Nauk Latviiskoi SSR, Riga. Izvestiya n12(197) p49-56 1963.

Descriptors: (*Magnetohydrodynamics, Laminar boundary layer), (*Laminar boundary layer, Separation), Magnetic fields, Experimental data, USSR.

AD-615 535 Div. 25/3
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ATTACK ON PLASMA, TEMPERATURE OF 100 MILLION DEGREES,
by V. Davydchenkov. 11 May 65, 6p
FTD-TT-65-448
TT 65-62302

Unclassified report

Unedited rough draft trans. from Nedelya (USSR) p9 Sep 19 1964.

Descriptors: (*Plasma medium, High-temperature research), (*Thermonuclear reactions, Control), Shock waves, Interferometers, Temperature, Velocity, Vacuum.

Experimental installations concerning the physics of plasma are reported to have been built by scientists of the Siberian Institute of Nuclear Physics. R. Sagdeyev obtained plasma by passing shock waves at 1000-km/sec velocity so that plasma was heated to 100 million degrees and retained for so long as several hundred thousands of fractions of a microsecond. Yu. Nesterikhin and his associates measured the temperature of plasma by using an optical interferometer. B. Chirikov and V. Volosov are searching for ways to control thermonuclear reactions; such control might be attained by having plasmas with electrons travelling at a velocity almost equaling the speed of light. The investigators F. Tsel'nik, V. Pal'chikov and B. Chirkov used ultrahigh vacuum for overcoming instability of plasma. The magnetic trap 'IN' was intended to carry out experiments with relatively slow electrons at a velocity of 150,000 km/sec and temperature down to one billion degrees.

AD-615 538 Div. 08/6
CFSTI Prices: HC$2.00 MF$0.50

Radiation Lab., Univ. of Michigan, Ann Arbor.
THE MINIMIZATION OF BACK SCATTERING OF A CYLINDER BY DOUBLE LOADING,
by Kun-Mu Chen. Apr 65, 39p
Scientific rept. no. SR-4, 5548-4-T
Contract AF19 628 2374, Proj. 5635, Task 563502
AFCRL 65-254

Unclassified report

Descriptors: (*Electromagnetic wave reflections, Cylindrical bodies), (*Cylindrical bodies, Electromagnetic waves), Scattering, Electrical impedance, Mathematical analysis, Integral equations.

A theory on the minimization of the back scattering of a cylinder by loading a cylinder at two points with lumped impedances is presented. The induced current on a doubly loaded cylinder when illuminated by a plane electromagnetic wave at an arbitrary angle is obtained. The optimum loading to eliminate the broadside back scattering which is caused by the symmetrical component of the induced current is established. A suitable loading to reduce the off-broadside back scattering, due to the antisymmetrical component of the induced current, is also determined. A proper choice of the impedance and the position of double loading can lead to the reduction of the back scattering over a wide aspect range. The useful formulas for optimum loading the some graphical illustrations are included. The advantages of double loading over central loading are discussed. (Author)

AD-615 553 Div. 25/3, 08/6, 08/7
CFSTI Prices: HC$5.00 MF$1.00

Microwave Lab., Stanford Univ., Calif.
NOISE AND CORRELATION STUDIES OF MICROWAVE RESONANCES OF A PLASMA COLUMN IN A MAGNETIC FIELD.
Supplementary technical rept.,
by G. N. Oetzel. Oct 64, 155p Rept. no. ML-1245
Contract AF49 638 1321
AFOSR 64-2494

Unclassified report

Descriptors: (*Plasma medium, Cyclotron resonance phenomena), (*Cyclotron resonance phenomena, Microwave frequency), (*Noise (Radio), Plasma medium), Magnetic fields, Plasma oscillations, Correlation techniques, Plasma sheath.

Recent observations of strong resonances at the harmonics of the electron cyclotron frequency in the noise emission from low temperature plasmas have raised the question of whether the harmonics were being generated in the volume of the plasma or in the sheath. Conclusive evidence is presented that the observed harmonic effects can be explained satisfactorily in terms of electrostatic oscillations in the plasma volume, and that they cannot be explained in terms of effects in the sheath. Good agreement with the calculated dispersion relation for the electrostatic oscillations was obtained in noise measurements. Transmission parallel to the magnetic field and plasma column was observed. The noise signals generated by heating the column in the fundamental and second harmonic modes were observed to propagate along the magnetic field and plasma column. Observations of noise emission, wave propagation, and resonances in modes other than the cyclotron harmonic modes are also presented. A theoretical discussion of the two-frequency correlation experiment and a further exploration of its experimental properties are given. (Author)

AD-615 555 Div. 08/6, 14/6, 25/3
CFSTI Prices: HC$5.00 MF$1.00

Raytheon Co., Waltham, Mass. Research Div.
STUDY OF MICROWAVE GENERATION BY MEANS OF ELECTRON BEAM INTERACTION WITH ANISOTROPIC MEDIA.
Rept. no. 6 (final), 1 Jul 63-31 Jan 65,
by S. F. Paik, R. J. Briggs, and J. M. Osepchuk.
31 Jan 65, 170p Rept. no. S-747
Contract DA36 039AMC02362E
Task 1G6 22001A055 04

Unclassified report

Descriptors: (*Microwave oscillators, Electron beams), (*Plasma medium, Microwave oscillators), (*Pyrolytic graphite, Microwave oscillators), Resonance absorption, Electric discharge, Feasibility studies, Waveform generators, Attenuation.

The possibility of generating a microwave signal by means of an interaction between electron streams and various anisotropic media is investigated. In particular, properties of microwave slow-wave systems made of plasmas and pyrolytic graphites are studied to determine

the feasibility of utilizing such slow-wave systems as circuits in beam-type microwave oscillators. Results of an experimental study on the surface-wave mode (backward-wave) of propagation in annular plasma columns is presented. Properties of the positive column of a dc discharge contained within two co-axial glass tubings are measured, and some basic differences between the discharge column and the ideal model of the plasma used for the analysis are pointed out. The density distribution is shown to be non-uniform, and the variation of the density profile with axial magnetic field is noted. Surface-wave modes of propagation predicted from the uniform quiescent plasma model are observed experimentally. The attenuation of the wave is observed to increase rapidly when a small magnetic field in the axial direction is applied. A theory of resonance absorption mechanism which occurs as a result of a gross density inhomogeneity is presented as a possible explanation for the enhanced attenuation observed.

AD-615 557 Div. 25/4, 25/2
CFSTI Prices: HC$3.00 MF$0.75

Airtron, Inc., Morris Plains, N. J.
GROWTH OF BROAD LINEWIDTH RUBY CRYSTALS.
Final rept. for 1 May 62-30 Apr 64.
30 Apr 64, 70p Rept. no. R11-454
Contract Nonr383200, ARPA Order 306
Unclassified report

Rept. on Proj. DEFENDER.

Descriptors: (*Lasers, Ruby), (*Ruby, Crystal growth), (*Crystal growth, Ruby), Gallium, Lead compounds, Fluorides, Chromium, Fluorescence, Bandwidth, Aluminum compounds, Gallium compounds, Chromium compounds, Oxides, Impurities.

Progress has been achieved in perfecting the techniques for the growth of ruby from flux and broadening the fluorescent linewidth by Ga additions. It has been demonstrated that large flux free ruby crystals suitable for fabrication into laser rods can be produced by spontaneous nucleation from slowly cooled molten salts. By lowering the pedestal supporting an 8 inch x 8 inch crucible until a 200C gradient is obtained, and slowly cooling a PbF2 melt at 1.5C per hour, large ruby plates up to 3/8 inches thick and 2 inches in maximum dimensions have been grown. Attempts to grow larger crystals by growth on ruby seeds were not successful, but it was established that crystals can be grown free from chromium content variation by using ruby nutrient and growing crystals in a temperature gradient under steady state conditions. Solubility of Al2O3 in PbF2 has been measured and the effect of Cr and Ga on the solubility has been determined. Chemical analysis of the crystals shows a concentration gradient exists for Cr but not for Ga. Line broadening was achieved in ruby crystals both by the deliberate addition of Ga, and by the substitution of 0(2-) by F(-) during crystal growth. Broadening in excess of 10/cm was obtained due to a combination of these factors. Two rods cut from these crystals lased at 2000 and 1200 joules respectively in a 3 inch long laser head at 200K. (Author)

AD-615 559 Div. 25/8, 09/1
CFSTI Prices: HC$4.00 MF$1.00

Michigan Univ., Ann Arbor.
INITIAL STUDIES OF CONDENSING METAL VAPORS CARRIED BY EXPANDING INERT GASES.
Final rept. for 1 Jun 62-31 May 64,
by Kenneth R. Sivier, Pai-Lien Lu, Donald D. McBride, and Erol Oktay. Mar 65, 142p
Contract AF33 657 8867, Proj. 7116, Task 711601
ARL 65-59 Unclassified report

Descriptors: (*Metals, Condensation), Vapors, Vapor pressure, Hypersonic nozzles, Jets, Instrumentation, Particles, Light, Scattering, Gas flow, Photomicrography, Helium group gases.

A report is presented on the progress of an experimental investigation of the condensation of metal vapors carried by an expanding inert gas initially at high pressure. Three zinc-in-helium tests in the Hotshot tunnel have indicated that the metallic condensate occurs in the form of very small particles; most particles were found to have diameters of from 0.01 to 0.1 microns. These particles were collected on impact probes from the hypersonic nozzle flow and analysed by electronmicroscopy. A spectrographic analysis of the particle samples showed that roughly one percent by mass of contaminants (principally copper, iron and silicon) were added to the zinc in the hotshot arc chamber. In addition to direct particle sampling, the techniques of light scattering and photomicrography (direct photography of the condensed particles) were investigated. The study of light scattering progressed to a bench set-up evaluation and calibration of a system that measures light attenuation by the scattering medium. Although indicating the possibility of the photography of one micron diameter particles traveling at high speed, the study of the photomicrography technique was discontinued in view of the very small particle sizes indicated by the direct samples from the zinc-in-helium tests. (Author)

AD-615 560 Div. 25/8, 09/1, 20/5, 27/3
CFSTI Prices: HC$4.00 MF$0.75

Princeton Univ., N. J.
LAMINAR MIXING AND HEAT TRANSFER PHENOMENA BETWEEN A PARTIALLY IONIZED GAS AND A GASEOUS COOLANT.
Interim rept. for 1 Oct 62-31 Aug 64,
by Jerry Grey, Peter M. Williams, David B. Fradkin, Paul F. Jacobs, and Martin P. Sherman. Apr 65, 112p
Contract AF33 657 9962; Grant NSF GP579,
Proj. 7063, Task 706301
ARL 65-73 Unclassified report

Descriptors: (*Plasma jets, Heat transfer), (*Jet mixing flow, Plasma jets), (*Heat transfer, Plasma jets), Laminar flow, Gas ionization, Coolants, Argon, Helium, Continuum mechanics, Probes (Electromagnetic), Enthalpy, Stagnation point, Plasma sheath, Arc-jet engines, Nuclear reactors.

Mixing and heat transfer characteristics of a laminar subsonic argon arcjet issuing into a stagnant atmosphere of room-temperature helium were investigated by a combined analytical-experimental approach. The analysis was based on classical continuum theory utilizing the boundary-layer approximation. Good correlation between theory and experiment was observed. Although the departure from equilibrium between the electrons and the heavy particles was estimated to be sufficiently small when considering the overall mixing process, it was shown analytically that this equilibrium probably did not exist in the regions of highest temperature gradient. It was, therefore, decided to explore the nature of this departure in the high-density (one atmosphere) collision-dominated, partly-ionized gas by the use of a cooled electrostatic probe. The theory for such a probe was formulated, and it appears to provide the capability for measuring both electron concentrations and electron temperatures.

AD-615 565 Div. 25/6
CFSTI Prices: HC$3.00 MF$0.75

Purdue Research Foundation, Lafayette, Ind.
SEMICONDUCTOR RESEARCH.

Semiannual rept. for 1 Oct 64-31 Mar 65.
31 Mar 65, 77p Rept. no. PRF-3324
Contract DA31 124ARORD17

Unclassified report

Descriptors: (*Semiconductors, Scientific research), Electrical properties, Optical properties, Low temperature, Theory, Anisotropy, Distribution, Oscillation, Excitation, Germanium, Gallium alloys, Arsenic alloys, Silicon alloys, Baron alloys, Zinc alloys, Tellurium alloys, Paramagnetic resonance, Magnetic fields, Thermal conductivity, Radiation damage.

Contents: Electrical and optical properties, Irradiation effects, Low temperature studies, Theoretical studies.

AD-615 568 Div. 25/4, 02/5
CFSTI Prices: HC$1.00 MF$0.50

Naval Ordnance Test Station, China Lake, Calif.
RADIOMETRIC BACKGROUND MEASUREMENTS OF 8 TO 14 MICRON RADIANCE,
by T. R. Stoner. May 65, 18p NOTS TP-3786
NAVWEPS 8730

Unclassified report

Descriptors: (*Infrared radiation, Background), (*Terrain, Infrared radiation), Temperature, Surface temperature, Earth, Reflection, Diurnal variations, Radiometers, Pavements, Concrete, Granite, Sand.

Radiometric background measurements in the 8 to 14 micron spectral region are discussed and illustrated in graph form for ten types of ground samples measured at the Naval Ordnance Test Station. Measurements are presented in terms of effective radiance plotted as a function of time of day. The effective radiance of the sky one degree above the horizon and above an elevation angle of about 30 degrees is also given. (Author)

AD-615 587 Div. 25/2, 14/2
CFSTI Prices: HC$1.00 MF$0.50

Weizmann Inst. of Science, Rehovoth (Israel).
LATTICE CONSTANTS OF ORTHOFERRITES,
by M. Eibschutz. 15 Sep 64, 14p
Technical Note no. TN-11
Contract AF61 052 654

Unclassified report

Descriptors: (*Ferrites, Crystal lattices), (*Crystal lattices, Ferrites), (*Rare earth compounds, Ferrites), Statistical data, Israel, Ytterbium compounds, Terbium compounds, Dysprosium compounds, Holmium compounds, Europium compounds, Thulium compounds, Yttrium compounds, Lutecium compounds, X-ray diffraction analysis, Atomic properties.

The lattice parameters of the orthoferrites RFeO3, where R is one of the trivalent rare earth ions Y,Tb,Dy, Ho,Eu,Tm,Yb, and Lu, are calculated using Cohen's analytical method. The parameters, a and c, vary regularly with the atomic number (or the ionic radius) of R, however the b parameter remains almost constant. (Author)

AD-615 589 Div. 25/3, 20/1
CFSTI Prices: HC$1.00 MF$0.50

Weizmann Inst. of Science, Rehovoth (Israel).
OBSERVATION OF SUPERPARAMAGNETISM BY THE MOSSBAUER EFFECT,
by S. Shtrikman, D. Treves, and W. J. Schuele.
15 Nov 64, 9p Technical note no. TN-13
Contract AF61 052 654

Unclassified report

Descriptors: (*Paramagnetic materials, Mossbauer effect), (*Hyperfine structure, Mossbauer effect), (*Powders, Ferromagnetic materials), Hysteresis, Particles.

Mossbauer spectra of Fe57 in ultrafine NiFe2O4 and CoFe2O4 powders were studied, as a function of crystallite size and temperature. The hyperfine field was found to collapse at a temperature, lower than the Curie points which decreases with particle size. This collapse of the hyperfine field is interpreted as motional narrowing due to the onset of superparamagnetism. (Author)

AD-615 590 Div. 25/3, 14/2, 25/6, 30/5
CFSTI Prices: HC$1.00 MF$0.50

Weizmann Inst. of Science, Rehovoth (Israel).
ORDERED MAGNETISM IN SOLIDS.
Annual summary rept.,
by D. Treves. 1 Jan 65, 6p
Contract AF61 052 654

Unclassified report

See also AD-602 640.

Descriptors: (*Magnetism, Solids), (*Ferrites, Magnetic properties), Mossbauer effect, Nuclear spectroscopy, Microwave spectroscopy, Very high frequency, Paramagnetic materials, Nuclear magnetic resonance, X-ray diffraction analysis, Single crystals, Crystal growth, Solids, Israel, Magnetic materials.

AD-615 593 Div. 25/6
CFSTI Prices: HC$1.00 MF$0.50

Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
SOLID STATE PHYSICS AT HIGH PRESSURES.
Progress rept. no. 33.
Nov 64, 21p
Contract NONR186610

Unclassified report

Descriptors: (*Solid state physics, High-pressure research), (*High-pressure research, Solid state physics), Optical properties, Electrical properties, Lead compounds, Tin, Semiconductors, Transition elements, Oxides, Pressure, Spectrum analysis, Antimony alloys, Gallium alloys, Transport properties.

Contents:
Optical and electrical properties of the lead salts under pressure
Electrical properties of gray tin as a function of pressure
Effect of pressure on reflectivity spectra
Spin resonance measurements on semiconductors
Investigation of the properties of the transition metal oxides
Construction and application of a new ratio type spectrometer for the measurement of small increments in absorption coefficients
Investigation of the semiconducting properties of forsterite
Investigation of Faraday rotation in semiconductors
Investigation of optical properties of semiconductor thin films
Investigation of the band structure of gallium antimonide
Infrared shift of the emission of lead salt diodes with pressure.

AD-615 594 Div. 25/6, 25/5, 25/7
CFSTI Prices: HC$1.00 MF$0.50

Cornell Univ., Ithaca, N. Y.
EFFECT OF MANY-BODY INTERACTIONS ON THE TEMPERATURE-DEPENDENT AMPLITUDE OF DE HAAS-VAN ALPHEN OSCILLATIONS,
by J. W. Wilkins and J. W. F. Woo. May 65, 9p
Technical rept. no. TR-6
Contract NONR40138 Unclassified report

Descriptors: (*N-body problem, Oscillation), (*Oscillation, Temperature), Magnetic fields, Band spectrum, Electrons, Quantum mechanics, Fermions, Metals.

AD-615 606 Div. 25/3, 15/1, 27/3
CFSTI Prices: HC$1.00 MF$0.50

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
STATIONARY CURRENT SHEET MODEL FOR PLASMA ACCELERATION.
Technical information series,
by F. W. Mezger. May 65, 19p Rept. no. R65SD21
Unclassified report

Descriptors: (*Plasma medium, Acceleration), (*Plasma engines, Space propulsion), Electric currents, Circuits, Differential equations, Ion accelerators, Shock tubes, Energy, Momentum, Mathematical models, Magnetic fields.

Difficulties with the usual circuit-current sheet model of the coaxial plasma accelerator are shown to arise in the case of a stationary current sheet. A suggestion for resolving these difficulties is made based on considering energy and momentum changes of the plasma moving through the current sheet. The resulting equations are confirmed by a detailed analysis of the circuit elements made up of the moving plasma within the current sheet. (Author)

AD-615 609 Div. 25/2
CFSTI Prices: HC$2.00 MF$0.50

Bausch and Lomb, Inc., Rochester, N. Y.
STUDY OF NON-OXIDE MATERIALS WITH DEFECT STRUCTURES.
Annual rept. for period ending 31 Dec 64,
by D. A. Buckner and P. C. Velasquez. 31 Dec 64, 30p
Contract Nonr363200, Proj. NR015 501, ARPA Order 269
Unclassified report

Descriptors: (*Fluorides, Crystal lattice defects), (*Crystal lattice defects, Fluorides), Calcium compounds, Sodium compounds, Yttrium compounds, Strontium compounds, Lanthanum compounds, Crystal lattices, Refractive index, Crystal lattices, Physical properties, Density, X rays, Crystals.

Three types of defects were described and found to exist in high concentration. These defects were exemplified by: (a) The system 3NaF.5YF3-CaF2 (The Half-Breed Defect Type); (b) The system CaF2-YF3 (The Interstitial Anion Defect Type); (c) The system LaF3-SrF2 (The Anion Vacancy Defect Type). The existence and nature of the defects were characterized by documentation of several physical measurements such as density, refractive index, and x-ray determined lattice parameters. In addition to the preparation of 'test tube' amounts of material, large batches were prepared and experiments in hot-pressing significant-size specimens of selected compositions were conducted. Resulting polycrystalline ingots were used in attempting some of the measurements of physical properties. (Author)

AD-615 625 Div. 09/4, 22/6
CFSTI Prices: HC$3.00 MF$0.75

Engineering-Physics Co., Rockville, Md.
THREE-DIMENSIONAL ANALYSIS OF BULK CAVITATION.
Interim rept.,
by Vincent Cushing, George Bowden, and Dean Reily.
24 Sep 62, 58p
Contract Nonr370900, Proj. 106
Unclassified report

Descriptors: (*Cavitation, Underwater explosions), Mathematical models, Cavitation noise, Sonic boom, Pressure, Spallation, Shock waves, Water waves.

The underlying theory is investigated as well as some of the practicable aspects associated with bulk cavitation and subsequent secondary pressure waves which have been observed in connection with underwater detonations of conventional high explosives as well as nuclear explosives. The detailed analysis and machine computational results are reported of the extent of the cavitated region as a function of depth of burst and yield. A rudimentary analysis of the expected water hammer and its associated secondary wave configuration are discussed.

AD-615 630 Div. 25/3, 08/6
CFSTI Prices: HC$4.00 MF$1.00

California Inst. of Tech., Pasadena.
AN EXPERIMENTAL STUDY OF THE HYDROMAGNETIC WAVEGUIDE,
by Robert Henry Hertel. Jan 65, 128p
Technical rept. no. TR-3
Contract AF49 638 1462
AFOSR 65-0726
Unclassified report

Descriptors: (*Waveguides, Magnetohydrodynamics), (*Magnetohydrodynamics, Waveguides), (*Plasma physics, Waveguides), Shock waves, Propagation, Attenuation, Plasma medium, Ions, Density, Temperature, Phase shift, Hydrogen, Magnetic fields, Cylindrical bodies, Metals, Theory, Mathematical analysis, Excitation.

The hydromagnetic waveguide consists of a cylindrical metal tube filled with a longitudinally magnetized plasma. Among the classes of waves which propagate in this system are the compressional hydromagnetic modes, characterized by a waveguide cutoff at low frequencies and by a resonance at the electron cyclotron frequency. This paper presents the results of observations of the propagation of such waves in a decaying hydrogen plasma at frequencies from 0.8 to 3.4 times the ion cyclotron frequency. The phase shift and attenuation of the waves are interpreted in terms of the ion density and the temperature by applying a theory based on a three-fluid description of the plasma. Spectroscopic measurements of the H sub beta line profile and absolute intensity are used to check the density and temperature inferred from the wave measurements. The results of this study indicate that a simple approximate relationship between the phase factor and density obtained by neglecting dissipation gives densities which agree well with the spectroscopic measurements.

AD-615 632 Div. 09/4
CFSTI Prices: HC$3.00 MF$0.75

Bureau d'Analyse et de Recherche Appliquees, Issy-Les-Moulineaux (France).
ANALOG STUDY OF HYDROFOILS NEAR THE FREE SURFACE,
by Daniel Fruman. Feb 65, 86p
Contract N62558 4113 Unclassified report

See also AD-602 430.

Descriptors: (*Hydrofoils, Design), Fluid dynamic properties, Mathematical analysis, Cavitation, Perturbation theory, Analog systems, France.

AD-615 644 Div. 25/2, 25/6
CFSTI Prices: HC$2.00 MF$0.50

Weizmann Inst. of Science, Rehovoth (Israel).
STUDIES ON ORTHOFERRITES AT THE WEIZMANN INSTITUTE,
by D. Treves. 15 Oct 64, 26p
Technical note no. TN-12
Contract AF61 052 654

Unclassified report

Descriptors: (*Ferrites, Crystal lattices), (*Yttrium compounds, Ferrites), (*Rare earth compounds, Ferrites), Crystal substructure, Anisotropy, Mossbauer effect, Ferromagnetism, Israel.

The Curie point, lattice constants sublattice magnetization, spontaneous moment and the nonlinear susceptibility have been measured on the compounds RFeO3 with R Yittrium or a Rare Earth. Conclusions are derived concerning the coupling between Rare Earth and Iron ions and the origin of weak ferromagnetion in these materials. (Author)

AD-615 646 Div. 25/3, 14/2, 25/2
CFSTI Prices: HC$3.00 MF$0.75

Weizman Inst. of Science, Rehovoth (Israel).
MAGNETIC PROPERTIES USING THE MOSSBAUER EFFECT.
Final rept.,
by Peter Hillman. Feb 65, 94p
Contract AF61 052 621

Unclassified report

Descriptors: (*Magnetic properties, Iron compounds), (*Mossbauer effect, Magnetic properties), (*Crystal structure, Iron compounds), Transition temperature, Crystal lattice defects, Magnetic fields, Heat treatment, Krypton, Oxides.

The structure and decomposition of wustite (Fe(1-x)O) have been studied by Mossbauer, magnetic and X-ray techniques. The antiferromagnetic Curie temperature of hematite (alpha-Fe2O3) has been determined to be about 685C from Mossbauer measurements. The Mossbauer efficiency of krypton in a clath-rate compound is constant at about 20% in the range 150-300K, and increases rapidly at lower temperatures. This behavior is not consistent with any static potential. (Author)

AD-615 653 Div. 25/6, 14/1, 17/2
CFSTI Prices: HC$4.00 MF$0.75

ARA, Inc., West Covina, Calif.
RESEARCH ON ENERGY ABSORBING STRUCTURES, PART III.
Final rept. for Feb 64-Feb 65.
Feb 65, 104p
Contract AF49 628 1144, Proj. 9782, Task 37718
AFOSR 65-0420

Unclassified report

See also AD-432 958.

Descriptors: (*Metal plates, Deformation), (*Structural shells, Deformation), (*Extendable structures, Deformation), Stresses, Mathematical analysis, Load distribution, Loading (Mechanics), Energy, Absorption, Damping, Hysteresis, Metal seals, Fuel tanks.

The report includes three somewhat different studies related to expandable and energy-absorbing structures for aerospace application. The first study is a very-large-deflection analysis of corrugated thin-shell structures employing the principle of minimum complementary energy in conjunction with a variational technique. A second area of study is an investigation of structural damping from hysteresis effects in metals associated with large inelastic deformations. Finally, a novel concept is introduced for a flexible metallic seal, and a theoretical and experimental study is described which demonstrates the feasibility of the concept as applied to a fuel expulsion tank. (Author)

AD-615 659 Div. 25/5, 04/4, 15/1
CFSTI Prices: HC$1.00 MF$0.50

Naval Ordnance Test Station, China Lake, Calif.
QUANTUM MECHANICS OF H02. III. THE NONZERO MATRIX ELEMENTS BETWEEN CONFIGURATIONS BASED ON MAXIMUM PAIRING OF AN ODD NUMBER OF ELECTRONS,
by R. H. Knipe. May 65, 24p NOTS-TP-3767
NAVWEPS 8720

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Free radicals, Peroxides), (*Quantum mechanics, Free radicals), (*Electron transitions, Matrix algebra), Molecular structure, Optimization, Atomic orbitals, Spin, Hamiltonian, Integrals, Selection rules, Chemical bonds, Hydrogen compounds, Oxygen compounds.

A many electron spin eigenfunction is considered constructed from an antisymmetrized linear combination of products of one-electron spin functions and space functions from an orthonormal set for the case of an odd number of electrons with maximum pairing. An explicit representation in terms of one- and two-electron integrals is given for the nonzero Hamiltonian matrix elements involving this function with itself or other similarly constructed functions. By considering permutation of the basis set of space functions, any nonzero matrix element between functions of this form may be obtained from the expressions that are given. (Author)

AD-615 673 Div. 09/1, 09/7

Technion - Israel Inst. of Tech., Haifa.
FRICTIONAL DRAG REDUCTION,
by C. Elata and J. Tirosh. 15 Dec 64, 6p
Contract N62558 4093

Unclassified report

Pub. in ISRAEL JOURNAL OF TECHNOLOGY v3 n1 p1-6 1965 (Copies available only to DDC users).

Descriptors: (*Drag, Turbulent boundary layer), (*Turbulent boundary layer, Drag), Friction, Reduction, Fluids, Fluid dynamic properties, Pipes, Mathematical analysis, Israel.

The paper deals with changes in the turbulent boundary layer resulting in frictional drag reduction. Experiments are described, showing a remarkable decrease in friction coefficients for dilute solutions of separan AP 30 and guar gum. It is shown from these data, and those available in literature for all kinds of additives, that drag reduction

effects nearly always coincide with a decrease in the universal constant k. This contradicts the generally accepted Reynolds similarity principle, which is the conventional assumption on which the analysis of the turbulent boundary layer is usually based. Furthermore, it appears that an additional entity must exist which influences the mechanism of turbulent flow. (Author)

AD-615 675 Div. 25/6, 08/2, 25/2

Shockley Lab., ITT Semiconductor, Palo Alto, Calif.
LOCALIZED ENHANCED DIFFUSION IN NPN SILICON STRUCTURES.
Revised ed.,
by R. Gereth, P. G. G. van Loon, and V. Williams.
23 Oct 64, 8p
Contract DA04 200ORD1166X.
AROD 3330:5

Unclassified report

Revision of manuscript submitted 10 Aug 64. Pub. in Journal of the Electrochemical Society v112 n3 p323-9 Mar 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Silicon, Impurities), (*Diffusion, Boron), (*Transistors, Diffusion), Semiconductors, Semiconducting films, Phosphorus, Epitaxial growth, Crystal structure.

Extensive studies of the Emitter Dip Effect (EDE) in npn silicon structures are reported. Typically, 1 ohm-cm n-type silicon starting material was used. Boron diffusion into this material resulted in a 0.7 micron base depth and surface concentrations of 1.8 x 10 to the 20th power/cc. The emitter regions had surface concentrations of 3 x 10 to the 20th power/cc and 0.4 micron junction depths. The dip was typically 0.3 micron, i.e., the base penetrated 0.3 micron deeper under the emitter than elsewhere. Important experimental findings are: (A) Crucible grown, zone refined, and epitaxial silicon give the same results. (B) The EDE occurs only if phosphorus doping is sufficient to overcompensate the base doping. (C) Multiple emitter diffusion causes multiple dips. (D) Slow cooling from diffusion temperature enhances the dip. (E) An enhanced boron diffusion constant in the base layer apparently causes the dip rather than the rejection of boron by the region of high phosphorus concentration. (F) The dip is not present for lightly doped (10 to the 17th power/cc) base layers. (Author)

AD-615 683 Div. 25/6, 04/4

California Univ., La Jolla.
SUPERCONDUCTING TUBES AND FILAMENTS,
by G. Arrhenius, R. Fitzgerald, D. C. Hamilton, B. A. Holm, and B. T. Matthias. 23 Jun 64, 5p
Grant AF AFOSR631 64
AFOSR 65-0794

Unclassified report

Pub. in Journal of Applied Physics v35 n12 p3487-90 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Superconductivity, Impurities), (*Filaments, Superconductors), (*Phase studies, Superconductors), (*Microstructure, Impurities), Cryogenics, Lanthanum, Rhodium, Iridium, Yttrium, Prismatic bodies.

A study is reported of the superconductivity and microstructure which occur when small quantities of La are quenched with Rh in the arc furnace. A strikingly regular prismatic honeycomb of a superconducting compound is found when the La concentration is > or =0.5 at %. For smaller concentrations a continuous network of the superconducting phase is no longer observed which correlates with the lowering and broadening of the superconducting transition region. Evidence is given that for such low concentrations superconducting tunneling occurs through the elemental Rh phase itself thus pointing to the superconductivity of Rh at lower temperatures. (Author)

AD-615 685 Div. 09/1

Delaware Univ., Newark.
TURBULENT FLOW CHARACTERISTICS OF VISCOELASTIC FLUIDS,
by A. B. Metznerand M. Graham Park. 19 Feb 64, 14p
Contract Nonr228503, Proj. NR062 294

Unclassified report

Pub. in Journal of Fluid Mechanics v20 pt2 p291-303 1964 (Copies available only to DDC users).

Descriptors: (*Turbulence, Compressible flow), (*Fluid flow, Viscoelasticity), (*Drag, Reduction), Particles, Continuum mechanics, Fluids, Mathematical analysis.

The turbulent flow characteristics of viscoelastic fluids are investigated quantitatively. The outstanding property of these flow fields is seen to be a very pronounced suppression of turbulence, accompanied by major reductions in the turbulent drag coefficients. Careful measurements of the rheological properties of the several fluids used suggest that the observed turbulence suppression is a function of the ratio of the elastic to the viscous forces developed in the fluid. An empirical correlation of the results, based upon this observation, is proposed; the present data, while indicative, are not sufficiently extensive to verify conclusively the existence of a quantitative correlation. In a number of respects, the observed reduction in drag is similar to that which may be obtained through promotion of 'slip' at the tube wall or by addition of particulate matter. It is shown that slip phenomena are clearly distinct from those studied in the present work but that particulate effects (albeit of much greater magnitude than observed heretofore) cannot be ruled out as contributory mechanisms. Further studies are thus required to determine the relative importance of continuum (viscoelastic) and particulate effects. (Author)

AD-615 691 Div. 25/5, 15/1

Marburg Univ. (West Germany). Institut fuer Theoretische Physik.
GENERAL QUANTUM FIELD THEORIES AND STRICT LOCALITY,
by Karl Kraus. 4 Jun 64, 13p
Contract AF61 052 658, Proj. 9767, Task 976703
AFOSR 65-0651

Unclassified report

Pub. in Zeitschrift fur Physik v181 p1-12 1964 (Copies available only to DDC users).

Descriptors: (*Field theory, Quantum mechanics), (*Quantum mechanics, Field theory), Operators (Mathematics), Algebra, Invariance, Quantum statistics.

A class of general quantum field theories without explicit use of fields A(x) is defined by a set of postulates for the von Neumann algebras R of local observables. The vacuum state is cyclic with respect to any R, and the Borchers tube theorem is shown to hold. Some R are factors and not of finite type. A property of local observables called strict locality is formulated and expressed by .neans of a necessary and sufficient condition for the algebras R. It is proved for finite regions. (Author)

AD-615 693 Div. 25/6, 15/1, 25/5

Naples Univ. (Italy).
INEQUIVALENT REPRESENTATIONS AND SUPER-CONDUCTIVITY,
by L. Leplae and H. Umezawa. 8 Feb 64, 25p
Grant AF EOAR62 104
AFOSR 65-0744

Unclassified report

Pub. in Il Nuovo Cimento v33 (Ser10) p372-96 1964
(Copies available only to DDC users).

Descriptors: (*Superconductivity, Field theory), (*Field theory, Quantum mechanics), Ground state, Electron transitions, Magnetic fields, Hamiltonian, Operators (Mathematics).

The problem of superconductivity is considered from the viewpoint of the theory of the inequivalent representations for the quantized field. This theory naturally leads to the conclusion that the ground state is not an eigenstate of the number of electrons. This conclusion is independent of the assumption of the pair effects, although our final results are same as those of the B.C.S. theory. It is shown that the quantization of the magnetic flux can also be explained by our viewpoint. In the last section the method of the computation for higher-order effects will be briefly discussed. (Author)

AD-615 699 Div. 25/2

Rutgers - The State Univ., New Brunswick, N. J.
Coll. of Engineering.
STRESS-STRAIN ANALYSIS OF SINGLE CUBIC CRYSTALS AND ITS APPLICATION TO THE ORDERING OR CuAu I. PAPER II,
by J. J. Slade, S. Weissmann, K. Nakajima, and M. Hirabayashi. 20 Apr 64, 13p
Grant AROD31 124G300
AROD 3560:7

Unclassified report

Pub. in Journal of Applied Physics v35 n11 p3373-85 Nov 1964
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Single crystals, Stresses), (*Stresses, Mathematical analysis), (*Crystal growth, Intermettalic compounds), (*Copper alloys, Gold alloys), Strain (Mechanics), Shear stresses, Deformation, Crystal lattice defects, Anisotropy, Elasticity, X-ray diffraction analysis, Metallic crystals.

A stress-strain analysis of single cubic crystals is developed which utilizes the strain data supplied by the x-ray back-reflection divergent beam method. The principal strains and their directions are determined and from the principal strains and the known elastic constants the complete stress-strain configuration is obtained. Thus the maximum magnitude and the direction of the shearing strain on a given set of crystallographic planes are obtained and the set of planes on which the maximum value of the shearing maxima occurs is also determined. From a knowledge of the stress-strain configuration, the stored elastic energy of the crystal is deduced. The conditions under which the principal stress system coincides with the principal strain system are also investigated. A number is constructed that measures the distortion of the crystal in terms of the energy increments associated with the elastic constants. The stress-strain analysis applied to the ordering of a CuAu crystal at 125C corroborates quantitatively the qualitative results previously obtained by transmission electron microscopy. The dependence of stored elastic energy on annealing time is determined. (Author)

AD-615 712 Div. 08/6, 06/6
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
REFLECTION OF ELECTROMAGNETIC WAVES FROM A ROUGH SURFACE,
by M. G. Kivelson and S. A. Moszkowski. May 65, 16p
Rept. no. RM-4468-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Electromagnetic wave reflections, Surfaces), (*Surfaces, Electromagnetic wave reflectional), Surface properties, Scattering, Radar, Statistical processes, Mathematical analysis, Theory.

It has been shown that in the small wavelength limit the backscattering cross section per unit area from a rough reflecting surface is given by d sigma sub B/d omega = 1/2 P (psi) where P(psi) = the probability that the normal to the surface makes an angle psi with respect to a reference surface. This formula was previously stated without proof in a paper by Salpeter and Treiman. (Author)

AD-615 727 Div. 25/2, 25/6

Southern Methodist Univ., Dallas, Tex.
SINGLE CRYSTAL ELASTIC CONSTANTS AND CALCULATED AGGREGATE PROPERTIES,
by Gene Simmons. 1965, 273p
Grant AF AFOSR418 63

Unclassified report

Available from Graduate Research Center, Inc., Dallas, Tex. $3.00
Pub. in Journal of the Graduate Research Center v34 n1/2 p1-269 Mar 1965.

Descriptors: (*Single crystals, Elasticity), (*Elasticity, Single crystals), Tables.

Data on the elastic properties of single crystals have been collected from the literature published through mid-1964. The elastic properties of isotropic aggregates (Young's modulus, Poisson's ratio, shear modulus, bulk modulus, compressibility, velocity of shear waves, and the velocity of compressional waves) are calculated according to the schemes of Voigt and Reuss. The tables include about 1100 determinations. (Author)

AD-615 755 Div. 08/6
CFSTI Prices: HC$4.00 MF$1.00

Courant Inst. of Mathematical Sciences, New York Univ., N. Y.
HIGH-FREQUENCY SCATTERING BY AN IMPENETRABLE SPHERE.
Technical documentary rept.,
by H. M. Nussenzveig. Mar 65, 131p
Research rept. no. EM-203
Contract AF19 628 3868, Proj. 5635, Task 563501
AFCRL 65-256

Unclassified report

Descriptors: (*Electromagnetic wave reflections Spheres), (*Spheres, Electromagnetic wave reflections), Diffraction, Numerical analysis, Potential theory, Transformations (Mathematics), High frequency.

The scattering of a scalar plane wave by a totally reflecting sphere (hard-core potential) at high frequencies is treated by a modified Watson transformation. The be-

havior of the solution both in the near and far regions of space is discussed, as well as the accuracy and domain of applicability of the WKB approximation and classical diffraction theory. It is shown that different transformations are required in the forward and backward half-spaces, and corresponding integral representations for the primary wave are derived. The transformations are rigorously proved and the convergence of the residue series is discussed. In the shadow region, the physical interpretation of the complex angular momentum poles in terms of surface waves is in agreement with Keller's geometrical theory of diffraction. In the lit region, sufficiently far from the shadow boundary, the WKB expansion for the wave function is confirmed up to the second order. On the surface of the sphere, Kirchhoff's approximation is accurate, except in the penumbra region, where the behavior is described by Fock's function. The diffraction effects in the neighborhood of the shadow boundary are investigated and the corrections to classical diffraction theory are obtained.

21. Propulsion and Fuels

AD-615 200 Div. 27/3, 10/6, 10/7
CFSTI Prices: HC$4.00 MF$0.75

Lockheed Missiles and Space Co., Sunnyvale, Calif.
EXPERIMENTS WITH A SOLID-PROPELLANT ACOUSTIC OSCILLATOR.
Technical rept.,
by J. F. Engler and W. Nachbar. Jul 63, 101p
Rept. no. 6-90-63-80

Unclassified report

Rept. on Materials and Chemistry.

Descriptors: (*Rocket motors (Solid propellant), Acoustics), (*Oscillation, Rocket motors (Solid propellant)), (*Acoustics, Rocket motors (Solid propellant)), (*Solid rocket propellants, Combustion), Combustion chambers, Pressure, Stability, Test equipment, Burning rate, Statistical analysis, Photographic analysis, Motion picture photography, Propellant grains, Combustion products.

An end-burning, side-vented, solid-propellant motor designed to produce essentially one-dimensional acoustic oscillations has been under development and test for the past three years. The immediate purpose of these investigations was to study the growth and decay of self-excited, combustion-driven, acoustic oscillations in chamber pressure and to measure the effects of operating parameters upon the growth rates, amplitudes, and frequencies of the oscillations. An ultimate purpose is to use this information as a guide to the further development of a theory of solid-propellant acoustic combustion instability. The report presents certain results from current experiments in which an essential innovation was the use of a transparent quartz tube containing the propellant sample and serving as part of the combustion chamber during burning. (Author)

AD-615 390 Div. 27/3, 09/1, 12/1
CFSTI Prices: HC$3.00 MF$0.75

Lockheed Missiles and Space Co., Sunnyvale, Calif.
GASDYNAMIC INTERACTIONS, INDEPENDENT DEVELOPMENT PROGRAM,
Summary rept.,
by V. V. Baicher, R. J. Kraus, and H. A. Ashby.
Jan 65, 71p Rept. no. TM-55-12-09

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Gas flow, Exhaust nozzles), (*Exhaust nozzles, Rocket motors), (*Rocket motors, Exhaust nozzles), Rocket propulsion, Supersonic flow, Stagnation point, Iterative methods.

The fundamental nature of the gas dynamic recirculation process was examined which gives rise to staging force, moment, and environment problems in nearly all rocket powered separations. Parametric cold gas experiments were conducted for a series of progressively more complex idealized interstage configurations which would exhibit, in sequence, the steps in the recirculation phenomenon. Theoretical work was initiated which is expected to lead to a method for making preliminary design estimates of recirculation effects on a wide variety of potential vehicle staging configurations.

AD-615 429 Div. 27/2
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON THE THEORY OF DISRUPTED FLUTTER OF A TURBO BLADE,
by V. A. Uspenskii. 5 Apr 65, 10p FTD-TT-64-1070
TT 65-62285

Unclassified report

Unedited rough draft trans. of Izvesttya Vysshikh Uchebnykh Zavedenii. Energetika (USSR) v7 n2 p68-73 1964.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Turbine blades, Flutter), (*Flutter, Turbine blades), Aeroelasticity, Oscillation, Stability, Axial-flow compressors, Axial-flow turbines, Design, Mathematical analysis, Angle of attack, Theory, Separation, USSR.

A theoretical solution is proposed for the problem of finding aerodynamic pressure forces acting against a unit of length of turbo-blade span, oscillating harmoniously. The solution results can be used to determine the critical rate of disruptive flutter and to determine deformations of blades with subsequent finding of stresses in the sections along the length of the blade.

AD-615 430 Div. 27/2
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
DETERMINING OPTIMUM DEGREES OF COMPRESSION AND EXPANSION IN A COMPLEX GAS TURBINE INSTALLATION,
by F. Z. Ratner. 5 Apr 65, 16p FTD-TT-64-1075
TT 65-62286

Unclassified report

Unedited rough draft trans. of Energomashinostroenie (USSR) v9 n11 p11-4 1963.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Gas turbines, Optimization), Compressive properties, Volume, Thermodynamic cycles, Compressors, USSR.

Formulas were derived for the determination of optimum by maximum efficiency and specific compression and expansion working stages in a complex cycle of a gas turbine installation. (Author)

AD-615 533 Div. 27/2
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PROBLEM OF DETERMINING DELIVERY COEFFICIENTS AND ANGLES OF OUTFLOW FROM BLADED DEVICES OF AXIAL GAS TURBINES,
by G. V. Proskuryakov. 5 May 65, 15p
FTD-TT-65-430
TT 65-62300

Unclassified report

Unedited rough draft trans. of Teploenergetika (USSR) v11 n9 p16-9 1964.

Descriptors: (*Gas turbines, Performance (Engineering)), (*Axial-flow turbines, Performance (Engineering)), (*Turbine blades, Design), Steam turbines, Gas flow, Mathematical analysis, Turbulence, Grilles, USSR.

Utilization of results of air blasting grills in static conditions when planning blading of gas turbines may lead sometimes to large errors in the aspect of determining flow out angles and, in consequence, power and efficiency of GTU. Delivery coefficients and angles of outflow from turbine grills should be determined by results of testing model stages in rotation or by calculation. Use of methods for the calculation of potential flow around profiles with an incompressible fluid, considerably facilitates the problem of planning blading. Determination of velocity curve of an incompressible flow on a profile and outflow angles with consideration of compressibility and viscosity should precede any experimental investigation of grill. Industrial tests confirmed the advisability of employing calculation methods in determining delivery characteristics of blading when planning gas turbines. (Author)

AD-615 602 Div. 10/4, 04/2, 20/3
CFSTI Prices: HC$0.50 MF$0.50

Naval Research Lab., Washington, D. C.
CHEMONUCLEAR SYNTHESIS OF NITROGEN-FLUORINE COMPOUNDS.
Interim rept.,
by R. N. Haszlett. 21 Apr 65, 14p Rept. no. NRL-6239
Proj. RR010 01 44 5851

Unclassified report

Descriptors: (*Rocket propellants, Synthesis (Chemistry)), (*Nitrogen compounds, Fluorides), (*Fluorides, Radiation chemistry), (*Radiation chemistry, Rocket propellants), Uranium compounds, Fission products, Nitrogen, Fluorine, Thermal neutrons, Azines.

Mixtures of nitrogen and fluorine containing uranium-235 as uranium hexafluoride were exposed to the radiation field of a nuclear reactor. The fission fragments formed by reaction of U(235) with the thermal neutron component of the reactor radiation caused the formation of nitrogen fluorides. Those identified were nitrogen trifluoride, cis-difluorodiazine, and trans-difluorodiazine. Nitrogen trifluoride is the major product, and the amount formed is dependent upon the total energy deposied. The other two products are in equilibrium with each other, and the amount formed decreases as the radiation intensity increases. The total G value for compound formation is less than 1 molecule per 100 electron volts. (Author)

AD-615 613 Div. 10/5, 12/5, 27/3
CFSTI Prices: HC$2.00 MF$0.50

Dynamic Science Corp., South Pasadena, Calif.
STUDY OF FORCES ON PROPELLANTS DUE TO HEAT TRANSFER INFLUENCING PROPELLANT TEMPERATURE IN A RECOVERY TYPE VEHICLE.
Monthly progress rept. no. 1.
10 Aug 62, 40p

Unclassified report

Prepared for Lockheed Missiles and Space Co., Sunnyvale, Calif., under Contract AF04 647 787.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Reentry vehicles, Rocket propellants), (*Rocket propellants, Heat transfer), Propellant tanks, Temperature, Reviews, Nitric acid, Helium, Dimethyl hydrazine (1-1), Nitrogen compounds, Dioxides, Thermal conductivity, Specific heat, Viscosity, Diffusion, Weightlessness, Test equipment.

The effort was confined primarily to a review of the existing Lockheed reports, assembly of available physical properties of the propellants and initiating a simplified analysis to give the order of magnitude values as an aid to specifying the important sources of forces resulting from heat transfer. (Author)

AD-615 614 Div. 10/5, 12/1, 27/3
CFSTI Prices: HC$2.00 MF$0.50

Dynamic Science Corp., South Pasadena, Calif.
STUDY OF FORCES ON PROPELLANTS DUE TO HEAT TRANSFER INFLUENCING PROPELLANT TEMPERATURE IN A RECOVERY TYPE VEHICLE.
Monthly progress rept. no. 2.
29Aug 62, 26p

Unclassified report

Prepared for Lockheed Missiles and Space Co., Sunnyvale, Calif., under Contract AF04 647 787. See also AD-615 613.

Descriptors: (*Reentry vehicles, Rocket propellants), (*Rocket propellants, Heat transfer), Propellant tanks, Temperature, Reviews, Evaporation, Condensation, Boiling, Surface tension, Thermal radiation, Differential equations, Thermal conductivity, Test equipment, Dimethyl hydrazine (1-1), Helium, Weightlessness.

All of the available LMSC publications on propellant orientation and temperature analyses were reviewed. Several simplified analyses were completed to get order-of-magnitude values for the forces on the propellant due to evaporation, condensation, diffusion, internal radiation, boiling, and surface tension. The laboratory equipment is being assembled for measuring the thermal conductivity of the propellant-helium vapor. A detailed steady-state analysis is presented for the mass transfer from a constant temperature hot liquid to a cooler liquid surface through a one-dimensional helium-propellant vapor region. (Author)

AD-615 615 Div. 10/5, 12/1, 27/3
CFSTI Prices: HC$2.00 MF$0.50

Dynamic Science Corp., South Pasadena, Calif.
STUDY OF FORCES ON PROPELLANTS DUE TO HEAT TRANSFER INFLUENCING PROPELLANT TEMPERATURE IN A RECOVERY TYPE VEHICLE.
Monthly progress rept. no. 3.
1 Oct 62, 30p

Unclassified report

Prepared for Lockheed Missiles and Space Co., Sunnyvale, Calif., under Contract AF04 647 787.
See also AD-615 614.

Descriptors: (*Reentry vehicles, Rocket propellants), (*Rocket propellants, Heat transfer), Propellant tanks, Temperature, Thermal conductivity, Test equipment, Transport properties, Weightlessness, Dimethyl hydrazine (1-1), Helium.

Experimental equipment to measure the thermal conductivities was designed and partially assembled. The equipment will be ready for use when the remaining components are received and the system has been calibrated. A detailed analysis was completed to determine the importance of free convection transport for gravitational fields from 10 to the -5 power g to 10 to the -9 power g. (Author)

AD-615 616 Div. 10/5, 12/1, 27/3
CFSTI Prices: HC$1.00 MF$0.50

Dynamic Science Corp., South Pasadena, Calif.
STUDY OF FORCES ON PROPELLANTS DUE TO HEAT TRANSFER INFLUENCING PROPELLANT TEMPERATURE IN A RECOVERY TYPE VEHICLE.
Monthly progress rept. no. 4.
31 Oct 62, 21p Unclassified report

Prepared for Lockheed Missiles and Space Co., Sunnyvale, Calif., under Contract AF04 647 787.
See also AD-615 615.

Descriptors: (*Reentry vehicles, Rocket propellants), (*Rocket propellants, Heat transfer), Propellant tanks, Temperature, Vapors, Thermal conductivity, Test equipment, Surface tension, Condensation, Films, Thickness, Dimethyl hydrazine (1-1), Helium, Weightlessness.

Experimental equipment to measure the thermal conductivities of vapor mixtures was completely assembled with the necessary electrical controls. A detailed analysis of the effect of surface tension variation with temperature as it affects propellant orientation was completed. (Author)

AD-615 617 Div. 10/5, 12/1, 27/3
CFSTI Prices: HC$2.00 MF$0.50

Dynamic Science Corp., South Pasadena, Calif.
STUDY OF FORCES ON PROPELLANTS DUE TO HEAT TRANSFER INFLUENCING PROPELLANT TEMPERATURE IN A RECOVERY TYPE VEHICLE.
Monthly progress rept. no. 5.
1 Dec 62, 33p Unclassified report

Prepared for Lockheed Missiles and Space Co., Sunnyvale, Calif., under Contract AF04 647 787.
See also AD-615 616.

Descriptors: (*Reentry vehicles, Rocket propellants), (*Rocket propellants, Heat transfer), Propellant tanks, Temperature, Phase studies, Surface tension, Mathematical models, Differential equations, Weightlessness, Films, Thickness, Transport properties, Dimethyl hydrazine (1-1), Helium, Thermal conductivity, Test equipment.

The purpose of the study was to indicate the effects on the liquid orientation and the temperature field due to the differential surface tension force acting along the liquid-vapor interface. The mathematical model described in this work yields a system of differential equations which is so complex that a proof for existance is beyond reach for the moment. However, from this system of equations, some methods can be found to estimate the differential surface tension effects in real tanks. It is shown that the differential surface tension force affects the heat transfer mechanism even though it does not affect the liquid orientation. The analysis applies only for liquid layer with thickness much less than the shorter length of the liquid surface. Hence, the liquid layer in the fuel tank of an Agena vehicle satisfies this restriction. The apparatus has been assembled for measurement of the thermal conductivity of the propellant-helium vapor mixtures. Calibration with standard gases has shown that the equipment will be satisfactory for the measurements.

AD-615 618 Div. 10/5, 12/1, 27/3
CFSTI Prices: HC$4.00 MF$1.00

Dynamic Science Corp., South Pasadena, Calif.
STUDY OF FORCES ON PROPELLANTS DUE TO HEAT TRANSFER INFLUENCING PROPELLANT TEMPERATURE IN A RECOVERY-TYPE VEHICLE.
Final rept.
15 Jan 63, 128p Unclassified report

Prepared for Lockheed Missiles and Space Co., Sunnyvale, Calif., under Contract AF04 647 787.
See also AD-615 617.

Descriptors: (*Reentry vehicles, Rocket propellants), (*Rocket propellants, Heat transfer), Propellant tanks, Temperature, Weightlessness, Surface tension, Thermal radiation, Phase studies, Evaporation, Condensation, Dimethyl hydrazine(1-1), Nitric acid, Helium, Transport properties, Diffusion, Viscosity, Specific heat, Thermal conductivity, Test equipment.

The heat transfer problem in a partially filled propellant tank system of an Agena space vehicle was formulated in a lumped capacity form which can be solved in principle by using an analog computer. The heat transfer mechanisms considered contain internal radiation, phase change due to evaporation and condensation, conduction, free convection and convection in liquid layers due to differential surface tension. Transport properties for gaseous UDMH, IRFNA and mixtures of helium with each gas were obtained by computation and experiment. Mass diffusivities for two and three component mixtures were computed by the methods of Bird, Stewart and Lightfoot. Viscosities and heat capacities for gaseous HDMH and nitric acid were rigorously computed; thermal conductivities of single gases were then calculated from the Eucken equation. Thermal conductivities of gas mixtures were calculated from the Mason-Saxena equations. Computed thermal conductivities were compared with experimental values obtained by means of a modified hot wire method employing five standard gases of various molecular weights. (Author)

AD-615 734 Div. 27/3
CFSTI Prices: HC$2.00 MF$0.50

Naval Ordnance Test Station, China Lake, Calif.
THE EFFECT OF AN INTENSE MAGNETIC FIELD ON ROCKET NOZZLE HEAT TRANSFER. PART 2. CRYOGENIC ELECTROMAGNET EXPERIMENTS.
Rept. for Nov 63-Jul 64,
by Leroy J. Krzycke and James B. Lee. Mar 65, 44p
NOTS TP-3545
Tasks RRRE06007 216 1F009 06 05, RMMP21001 216 1F009 01 06
NAVWEPS 8494 P2 Unclassified report

See also AD-613 992.

Descriptors: (*Magnetic fields, Rocket nozzles), (*Rocket nozzles, Magnetic fields), (*Heat transfer, Rocket nozzles), Electromagnets, Cryogenics, Turbulent boundary layer, Gases, Solenoids, Electrical conductance, Electron density.

The report describes a theoretical and experimental investigation of the effect of an axial magnetic field on rocket nozzle heat transfer. The expected reduction in heat transfer was predicated on the anisotropy in the transport coefficients of a partially ionized gas in a magnetic field. Calculations of the electrical properties of the nozzle core and boundary layer gases were made using advanced chemical equilibrium and boundary layer heat transfer computer programs. The gas electrical conductivity and electron density decreased by a factor of ten in the turbulent boundary layer and by an even greater factor in the laminar sub-layer. A 5.3-T magnetic field, generated by a force-cooled cryogenic electromagnet, failed to produce a detectable change in the heat transfer from the seeded hydrocarbon combustion gases to a water-cooled copper rocket nozzle wall. This result was insensitive to field direction. The boundary layer gases were insufficiently ionized for a measurable interaction with the magnetic field. (Author)

22. Space Technology

AD-615 230 Div. 12/6
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
COLONIZING OUTER SPACE,
by B. Lyapunov. 20 Apr 65, 13p FTD-TT-64-1181
TT 65-62230

Unclassified report

Unedited rough draft trans. of Krylya Rodiny (USSR) v15 n8 p23-4 1964.

Descriptors: (*Spacecraft, Maintainability), Spacecraft cabins, Exterrestrial bases, Manned spacecraft, Satellites (Artificial), USSR.

The problems encountered in the establishment of extraterrestrial stations, manned orbiting stations, and other 'dwellings in ether' are treated. The problems include gravity, weightlessness, food, communication with the earth, solar energy, dangers from radiation and meteors, and construction materials.

AD-615 257 Div. 12/6
CFSTI Prices: HC$1.00 MF$0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
OVER THE PLANET EARTH,
by V. Komarov, K. Feoktistov, and B. Egorov.
30 Apr 65, 22p FTD-TT-64-1325
TT 65-62257

Unclassified report

Unedited rough draft trans. of continued article from Pravda, Moscow (USSR) 6-9 Nov 1964.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Astronauts, USSR), Space flight, Space environmental conditions.

AD-615 264 Div. 12/6, 30/1
CFSTI Prices: HC$1.00 MF$0.50

Lockheed Missiles and Space Co., Sunnyvale, Calif.
LMSC PUBLISHED CONTRIBUTIONS 1964 IMPRINTS.
Citation Bibliography,
comp. by J. T. Reinburg and W. A. Kozumplik.
Apr 65, 22p Rept. no. CB-65-1

Unclassified report

Descriptors: (*Bibliographies, Space flight), (*Space flight, Guided missiles), Physics, Materials, Electronics, Engineering, Nuclear physics, Geophysics, Mechanics, Astrophysics, Metallurgy, Cryogenics, Solid state physics, Thermodynamics, Fluid mechanics, Ceramic materials, Atmosphere.

Papers published by authors in Lockheed Missiles and Space Company during 1964 are listed.

AD-615 361 Div. 12/6,12/2

RAND Corp., Santa Monica, Calif.
OPTIMIZATION OF MULTISTAGE ORBIT TRANSFER PROCESSES BY DYNAMIC PROGRAMMING,
by F. T. Smith. 17 Feb 61, 8p Unclassified report

Pub. in ARS Journal v31 n11 p1553-9 Nov 1961
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Optimization, Transfer trajectories), (*Transfer trajectories, Dynamic programming), (*Dynamic programming, Orbital trajectories), Staging, Thrust vector control systems, Satellites (Artificial).

This paper discusses the development of a set of variation of parameter equations that define state transformations of a vehicle in terms of some selected set of two-body orbit parameters. The state transformation equations obtained by integration of the variation of parameter equations are substituted in a performance index that is optimized by the methods of dynamic programming. This optimization gives a sequence of incremental velocity vectors to be applied to the vehicle to transfer it from an arbitrary initial orbit to the desired orbit. In addition to the multistage process, three special cases are considered: a single stage process, a double stage process, and a special performance index pertinent to 24-hr communication satellites. (Author)

AD-615 397 Div. 12/6, 12/5, 02/1
CFSTI Prices: HC$1.00 MF$0.50

Sand-Air, Inc., Point Mugu, Calif.
PERTURBATION OF THE FIRST ORDER IN THE MOTION OF AN ARTIFICIAL SATELLITE CAUSED BY THE OBLATENESS OF THE EARTH.
Language Trans. Series,
by V. F. Proskurin and Yu. V. Batrakov. 1 Nov 60,
14p Rept. no. LTS-1
Contract N123 61756 19425APMR
TT 61-15118

Unclassified report

Trans. from Iskusstvennye Sputniki Zemli (USSR) n3 1959.

Descriptors: (*Satellites (Artificial), Motion), (*Perturbation theory, Celestial mechanics), Orbital trajectories, Gravity, Potential theory, Power series, USSR.

The motion of the satellite and the gravitational field of an oblate planet is considered under the assumptions that the inclination of the orbit may be arbitrary, that the planet has the form of a smooth ellipsoid of revolution, and that the polar compression is small enough so that the expansion of the perturbation function can be restricted to the first degree term. The perturbation function is expanded into a power series in terms of the eccentricity; the coefficients of this series are expressed quite simply in terms of trigonometric functions of the angle of inclination. The integration of the ordinary Lagrange equations yield analytic expressions of the first order perturbations of the orbital elements in terms of the compression of the planet. The precision is up to the fourth power of the eccentricity. (Author)

AD-615 398 Div. 12/6, 12/1, 02/1, 15/1
CFSTI Prices: HC$1.00 MF$0.50

Land-Air, Inc., Point Mugu, Calif.
ON THE STABILITY OF REGULAR MOTIONS OF ARTIFICIAL CELESTIAL BODIES.
Language Trans. Series,
by G. N. Duboshin. 15 Dec 60, 24p Rept. no. LTS-2
Contract N123 61756 19425APMR
TT 61-15288

Unclassified report

Trans. of Astronomicheskii Zhurnal (USSR)

v36 n4 p723-33 1959
Another trans. is available from LC or SLA mi$2.40, ph$3.30 as 61-10637, 1961, 18p.

Descriptors: (*Satellites (Artificial), Rotation), (*Differential equations, Celestial mechanics), Circular orbit trajectories, Perturbation theory, Gravity, Motion.

The motion of an artificial satellite around the earth is considered. The earth is assumed to be a homogeneous sphere. The satellite itself is assumed to have an arrow-like form and to be dynamically similar to a rectilinear homogeneous segment, which we shall call a 'rod'. No other forces besides the attraction of the earth are taken into account. The resistance of the earth's atmosphere is also not taken into consideration. Under these conditions the differential equations of the relative motion of the satellite around the earth allow some particular solutions corresponding to the simplest motions of the satellite, which are termed 'regular'.

AD-615 399 Div. 12/6, 12/5, 15/1
CFSTI Prices: HC$2.00 MF$0.50

Land-Air, Inc., Point Mugu, Calif.
NUMERICAL METHODS FOR SOLVING FINITE DIFFERENCE EQUATIONS AND THEIR USE IN THE COMPUTATION OF ORBITS OF ARTIFICIAL SATELLITES OF THE EARTH.
Language Trans. Series,
by G. P. Taratynova. 15 Jan 61, 48p Rept. no. LTS-3
Contract N123 61756 19425APMR
TT 61-19039

Unclassified report

Trans. of Iskusstvennye Sputniki Zemli (USSR)
v4 p56-81 1960.

Descriptors:(*Orbital trajectories, Satellites (Artificial)), (*Numerical analysis, Orbital trajectories), (*Difference equations, Numerical analysis), Celestial mechanics, USSR.

The need for such methods arose in solving certain celestial mechanics problems in which one had to find the solution of a system of nonlinear differential equations describing motion over long time intervals. These problems involved the determination of the time of existence of an artificial satellite, the determination of the evolution of a satellite's orbit, the interval of validity of a given prognosis of an orbit, etc. The methods presented are of a general nature and can be used for the solution of a broad class of nonlinear oscillatory systems. (Author)

AD-615 400 Div. 12/6, 12/1, 02/1, 15/1
CFSTI Prices: HC$1.00 MF$0.50

Land-Air, Inc., Point Mugu, Calif.
DETERMINATION OF THE ORBITAL PARAMETERS OF ARTIFICIAL SATELLITES ON THE BASIS OF OBSERVATIONS FROM THE EARTH'S SURFACE.
Language Trans. Series,
by T. M. Eneev, A. K. Platonov, and P. K. Kazakova.
15 Mar 61, 25p Rept. no. LTS-4
Contract N123 61756 19425A PMR
TT 61-19531

Unclassified report

Trans. of Iskusstvennye Sputniki Zemli (USSR)
v4 p43-55 1960.

Descriptors: (*Satellites (Artificial), Orbital trajectories), (*Orbital trajectories, Tracking), Optical tracking, Radar tracking, Celestial mechanics, Numerical analysis, Matrix algebra, Iterative methods, Mathematical prediction, Partial differential equations.

Methods are presented for the determination of the orbital elements of a satellite and of the analysis of its motion on the basis of the processing of optical and radar observation data. The methods are designed for the utilization of high speed electronic computing machines. (Author)

AD-615 404 Div. 12/6, 12/5, 02/6
CFSTI Prices: HC$2.00 MF$0.50

Land-Air, Inc., Point Mugu, Calif.
MOTION OF AN ARTIFICIAL SATELLITE IN THE NORMAL GRAVITATIONAL FIELD OF THE EARTH.
Language Trans. Series,
by M. D. Kislik. 1 May 61, 31p Rept. no. LTS-6
Contract N123 61756 19425APMR
TT 61-27018

Unclassified report

Trans. of Iskustvennye Sputniki Zemli (USSR)
v4 p3-17 1960.

Descriptors: (*Satellites (Artificial), Motion), Gravity, Earth, Potential theory, Orbital trajectories, USSR.

The motion of an artificial satellite in the normal gravitational field of the earth is analyzed without taking account of the air resistance or the anomalies of the force of gravitation. The results can be used for the computation of orbits of high altitude satellites and also for the qualitative analysis of the effect of the earth's oblateness on the motion of satellites.

AD-615 433 Div. 12/6, 12/5, 02/1, 02/6, 02/7, 16/10
CFSTI Prices: HC$6.00 MF$1.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
COSMIC RESEARCH, 1965, VOL. 3, NO. 2.
20 May 65, 289p FTD-TT-65-414
TT 65-62289

Unclassified report

Unedited rough draft trans. of *Kosmicheskie Issledovaniya (USSR) v3 n2 p179-345 1965.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Satellites (Artificial, Terrestrial magnetism), (*Astronautics, Space medicine), Perturbation theory, Rockets, Upper atmosphere, Ultraviolet radiation, Scattering, Periodic variations, Infrared radiation, Earth, Atmosphere, Density, Mass spectroscopy, Space flight, Cosmic rays, Solar flares, Microbiology, Solar radiation, Mars, Planetary atmospheres.

Table of contents: Coefficients of the Equations of Perturbed Motion of a Solid Body with Cavities Partly Filled with Liquid. Perturbed Motion of a Solid Body with Cavities Partly Filled with Liquid. The Motion of Particles of Various Energies in a Rotating Magnetosphere. The X-, Y- and Z-Components of the Geomagnetic Field on Satellites and Rockets. Scattered Ultraviolet Radiation in the Upper Atmosphere of the Earth. The Sun's X-Ray Emission. IV. Measurement of the Radiation Flux in the Spectral Region 2-18 A. Seasonal Variations in the Thermal Radiation Field of the Earth and Atmosphere in the Infrared Region of the Spectrum. Brightness of the Atmosphere at Altitudes of 120-450 km. Variability

in the Coefficient of Aerodynamic Resistance in Determining Atmospheric Density on the Basis of Artificial-Satellite Deceleration. Optimum Analyzer Designs for a Radio-Frequency Mass Spectrometer with Two and Three Drift Spaces. Biological Effectiveness of a Number of Space-Flight Factors. Biological Effect of Cosmic Radiation in the Event that Solar Flares Occur on the Earth to Moon Route in Model Experiments. A Chamber Simulating the Conditions of Mars for Microbiological Research.

AD-615 454 Div. 12/6, 12/1, 32/6
CFSTI Prices: HC$6.00 MF$1.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SPACE AND INTERNATIONAL COOPERATION,
25 May 64, 266p FTD-MT-64-176
TT 65-62291

Unclassified report

Edited machine trans. of mono. Kosmos i Mezhdunarodnoe Sotrudnichestvo, Moscow, 1963, p1-256.

Descriptors: (*Space flight, Law), (*Law, Space flight), Foreign policy, Space communication systems, Radio-frequency, East Germany, United States Government, USSR, United Nations.

Contents:
On the 70th birthday of Yevgeniy Aleksandrovich Korovin
Legal regime of outer space at the contemporary level, by G. P. Zhukov
Legal regulation of activity in outer space, by I. I. Cheprov
UN Committee on the Peaceful Uses of Outer Space, by F. N. Kovalev
Role of specialized UN institutions in the Development of international cooperation in mastering of outer space for peaceful purposes, by G. S. Stashevskiy
The question of assignment and international regulation of radio frequencies for space services, by D. D. Yerigin
Space law as the result of technological progress, by M. I. Lazarev
Questions of space law in the Inter-Parliamentary Union, by V. L. Shvetsov
Questions of the regime of outer space in the juridical literature of the German Democratic Republic, by A. I. Munder
Questions of cosmic law in the latest American literature, by E. G. Vasilevskaya
Soviet literature on space law.

AD-615 517 Div. 12/6, 12/1, 12/2, 12/3, 12/4, 26/2
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
A MODEL FOR PROJECTING COSTS OF SPACE EXPLORATION,
by J. String. Apr 65, 24p Rept. no. P-3119

Unclassified report

Rept. prepared for presentation at a meeting of the American Statistical Association, Southern Calif. Chapter, 28 Jan 65.

Descriptors: (*Space flight, Costs), Manned spacecraft, Management planning, Decision making, Budgets, Production, Statistical analysis, Mathematical models.

A model was developed for determining the costs of advanced space hardware and for assessing the budgetary implications of integrated space exploration plans. The model has three basic characteristics: (1) it is a long-range planning model; (2) it estimates the resource implications of alternative NASA over-all space plans in such a way as to allow relating of resource requirements to the objective of these plans; and (3) its purpose is to provide, in part, a basis for making decisions on major activities to be pursued by NASA in the future. It is designed to yield projections of the budgetary implications of space activity plans under these rather serious data base limitations and technological and operational uncertainties. (Author)

AD-615 759 Div. 12/6, 12/1, 06/6
CFSTI Prices: HC$1.00 MF$0.50

General Electric Co., Philadelphia, Pa. Missile and Space Div.
A MISSION COST MODEL FOR FERRET SATELLITES.
Technical information series,
by H. C. Sebring. 1 May 65, 23p TIS65SD236

Unclassified report

Descriptors: (*Radar signals, Detection), (*Satellites (Artificial), Costs), (*Operations research, Satellites (Artificial)), Models (Simulations), Systems engineering, Probability, Wave transmission, Orbital trajectories.

An analytical model to evaluate ferret satellite systems is explicated. It may also be used to yield inputs for specific system definition. In addition to the general stochastic nature of radar signal detection, analyses are applied to the cases of unknown emitter bandwidths and to the detection of known frequencies. The conditions of emitter operation and overflight are included. The signal detection probability is implicitly an input to a cost effectiveness methodology which considers major parameters such as orbital altitude, payload weight, reliabilities, launching requirements and costs, weights and costs of satellites and ancillary equipment, and total mission cost to achieve objectives with predetermined confidence. Logic is drawn from the model to support the conclusion that, ignoring safety tolerances, the minimum orbital altitude related to the desired lifetime is preferred. Numerical examples are presented; however, the principal purpose of the paper is to document the analytical method. There is no application to specific systems that might be postulated. (Author)

How To Use Indexes To TAB Portion Of

U. S. GOVERNMENT RESEARCH AND DEVELOPMENT REPORTS

(Because these indexes are entirely machine-run some errors will occur. The user is asked to bear with these in the interests of speed and economy.)

SUBJECT INDEX

The Subject Index is arranged alphabetically by asterisked descriptors from the document announcements in the TAB. Each announcement contains one or more asterisked descriptors which identify the main subjects of the report. The asterisked descriptor may or may not have a modifying descriptor appearing directly below the asterisked descriptor. Under each descriptor entry in the Subject Index appear the following items of information: annotation, AD number, and division number. A typical subject index entry is shown below.

*COMBUSTION
OSCILLATION
INTENTIONAL COMBUSTION
OSCILLATIONS IN PROPULSION
SYSTEMS
AD-608 206 DIV. 25

PERSONAL AUTHOR INDEX

The Personal Author Index is arranged alphabetically by the last names of the authors of reports. When several report entries are given for one author, the entries are arranged numerically by AD number. Division numbers and titles are also listed. Again, three asterisks serve as a separator between entries for reports under the same author. A typical personal author entry is shown below.

*BENDAT, JULIUS S.
* * *
ZERO CROSSINGS OF A SINE
WAVE PLUS RANDOM NOISE
AD-608 019 DIV. 15
* * *
SPECTRA AND AUTOCORRELATION
FUNCTIONS FOR FULLY DEVELOPED
SEAS AND PREDICTION OF STRUCTURAL
FATIGUE DAMAGE
AD-608 464 DIV. 2

CORPORATE AUTHOR-MONITORING AGENCY INDEX

The Corporate Author-Monitoring Agency Index is arranged alphabetically by corporate authors and monitoring agencies.

In the corporate author entry (designated by an asterisk) for each document are listed the originator of the report, the originator's report number, the title, AD number, and division number. If the source has listed a monitoring agency

in the report, the monitor acronym and monitor series number are given in parantheses directly under the title. An IDEP (Interservice Data Exchange Program) report number is presented in the same way. A typical corporate author entry is shown on the next page.

*SHEFFIELD UNIV (ENGLAND)
* * *
HIC 45
INTENTIONAL COMBUSTION OSCILLATIONS IN PROPULSION SYSTEMS.
(AFOSR 64 2029)
AD-608 206 DIV. 25

The three asterisks serve as a separator between entries for reports under the same corporate author.

When a report lists a monitoring agency, a corresponding entry is provided under the name of the monitoring agency, which appears in alphabetical order among the corporate author entries. In a monitoring agency entry, the report number is given above the title in place of the originator's report number. A typical monitoring agency entry is shown below.

*AIR FORCE OFFICE OF SCIENTIFIC RESEARCH WASHINGTON D C
* * *
64 2029
INTENTIONAL COMBUSTION OSCILLATIONS IN PROPULSION SYSTEMS.
AD-608 206 DIV. 25

CONTRACT INDEX

The Contract index is arranged alphanumerically by contract number. Within a contract grouping, each entry contains corporate author, series number (if any), monitor number (if any), AD number, and division number.

When there are multiple document entries under one contract number, entries are arranged by AD number under each corporate author represented.

A contract entry may also contain a letter F, A, or S on the left-hand margin, indicating that the document is a Final, Annual, or Summary report. A typical contract entry is shown below.

*AF19 628 500
LINCOLN LAB MASS INST OF TECH LEXINGTON
LL TR 365
(ESD TDR64 378)
AD-608 272 DIV. 30
LL 1964 63
(ESD TDR64 566)
AD-608 288 DIV. 8

AD-DIVISION INDEX

The AD-Division Index is arranged numerically by AD number and lists the subject division where the full entry can be located in TAB.

SUBJECT INDEX

The fields indicated here apply only to the Technical Abstract Bulletin Section (On White Paper).

•ABLATION
GLASS
EXPERIMENTAL STUDY ON THE LIQUID LAYER INSTABILITIES OF AN ABLATING BODY.
AD-615 977 FLD. 11

•ABSORPTION SPECTRUM
AIR
TRANSLATION OF RUSSIAN RESEARCH: EXPERIMENTAL MEASUREMENT OF RHT ABSORPTIVITY OF AIR BEHIND THE FRONT OF A SHOCK WAVE.
AD-615 289 FLD. 20
REPRINT: SPECTRAL ABSORPTION IN HEATED AIR.
AD-615 690 FLD. 20

NITROGEN
REPRINT: ABSORPTION SPECTRUM OF ELECTRICALLY EXCITED NITROGEN MOLECULES IN THE VACUUM-UV REGION.
AD-615 377 FLD. 20

WATER VAPOR
REPRINT: APPROXIMATIVE BAND ABSORPTION AND TOTAL EMISSIVITY CALCULATIONS FOR H20.
AD-615 684 FLD. 20

•ABSTRACTING
AUTOMATIC
APPLICATION OF ENGLISH-WORD MORPHOLOGY TO AUTOMATIC INDEXING AND EXTRACTING.
AD-615 924 FLD. 5

•ACCELERATION TOLERANCE
ASTRONAUTS
REPRINT: TOLERANCE TO TRANSVERSE (GX) AND HEADWARD (GZ) ACCELERATION AFTER PROLONGED BED REST.
AD-615 379 FLD. 6

HUMANS
SUMMARY OF HUMAN TOLERANCE TO PROLONGED ACCELERATION.
AD-615 570 FLD. 6

•ACCLIMATIZATION
RATS
REPRINT: RATS AND THEIR TAILS IN TEMPERATURE REGULATION AND ACCLIMATIZATION.
AD-615 208 FLD. 6

SALICYLATES
REPRINT: EFFECTS OF SALICYLATE ON ACCLIMATIZATION TO WORK IN THE HEAT.
AD-615 197 FLD. 6

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SIMULATION
TRANSLATION OF RUSSIAN PATENT: METHOD OF SIMULATING ACOUSTIC PROCESSES IN ENCLOSED SPACES.
AD-615 293 FLD. 20

•ACOUSTIC PROPERTIES
MINERALS
THE PRESSURE DERIVATIVES OF THE SOUND VELOCITIES OF POLYCRYSTALLINE MAGNESIA.
AD-615 623 FLD. 8

•ACOUSTICS
ROCKET MOTORS(SOLID PROPELLANT)
EXPERIMENTS WITH A SOLID-PROPELLANT ACOUSTIC OSCILLATOR.
AD-615 200 FLD. 21

•ADAPTIVE COMMUNICATION SYSTEMS
MILITARY REQUIREMENTS
A BRIEFING ON THE DISTRIBUTED ADAPTIVE MESSAGE-BLOCK NETWORK.
AD-615 396 FLD. 17

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OILS
TRANSLATION OF RUSSIAN RESEARCH: MECHANISM OF THE ACTION OF VISCOUS ADDITIVES.
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AGING(PHYSIOLOGY)
STUDIES CONCERNING LONGEVITY, AGING AND PRODUCTIVITY IN AEDES AEGYPTI (L).
AD-615 304 FLD. 6

•AERIAL PHOTOGRAPHY
SIMULATION
STUDY OF IMAGE-EVALUATION TECHNIQUES.
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STUDY OF IMAGE-EVALUATION TECHNIQUES.
AD-615 648 FLD. 14

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MATHEMATICAL MODELS
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STUDY OF IMAGE-EVALUATION TECHNIQUES.
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EFFECTS OF ACTIVE COOLING ON THE AERODYNAMIC AND AEROTHERMODYNAMIC CHARACTERISTICS OF SLENDER BODIES OF REVOLUTION.
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ABSORPTION SPECTRUM
TRANSLATION OF RUSSIAN RESEARCH: EXPERIMENTAL MEASUREMENT OF RHT ABSORPTIVITY OF AIR BEHIND THE FRONT OF A SHOCK WAVE.
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AD-615 690 FLD. 20

THERMODYNAMICS
EQUILIBRIUM THERMODYNAMIC PROPERTIES OF AIR BEHIND INCIDENT NORMAL SHOCK WAVES.
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COMBAT INFORMATION CENTERS
GEOLOGY OF THE NORTH AMERICAN AIR DEFENSE COMBAT OPERATIONS CENTER, CHEYENNE MOUNTAIN AND PERIPHERAL AREA, NEAR COLORADO SPRINGS, EL PASO COUNTY, COLORADO.
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COST MODEL TO SUPPORT AIR FORCE LONG-RANGE PLANNING.
AD-615 901 FLD. 15

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ARCTIC REGIONS
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AD-615 621 FLD. 5

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IDENTIFICATION SYSTEMS
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AD-615 266 FLD. 17

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TRANSLATION OF RUSSIAN ARTICLE: L-29 AIRPLANE.
AD-615 286 FLD. 1

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SCALE MODEL TECHNIQUES FOR INVESTIGATION OF AIRCRAFT ANTENNA RADIATION PATTERNS.
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SPLITTER EFFECT IN CONICAL DIFFUSERS. EXPERIMENTAL PHASE INCOMPRESSIBLE FLOW.
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GRAIN BOUNDARY RELAXATION IN FOUR HIGH PURITY, FACE CENTERED CUBIC METAL'S: ALUMINUM, NICKEL, COPPER, AND SILVER.
AD-615 636 FLD. 11

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AD-615 566 FLD. 11

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ASTRAC II PLUG-IN DIODE FUNCTION GENERATOR.
AD-615 439 FLD. 9

•ANALOG-TO-DIGITAL CONVERTERS
CIRCUITS
TRANSLATION OF RUSSIAN RESEARCH: METHOD OF CHANGING OVER ANALOG VALUES TO A DIGITAL CODE.
AD-615 291 FLD. 9

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STRESS(PHYSIOLOGY)
TRANSLATION OF RUSSIAN RESEARCH: FUNCTIONS OF THE ORGANISM UNDER CONDITIONS OF AN ALTERED GAS MEDIUM.
AD-615 721 FLD. 6

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AIRCRAFT ANTENNAS
SCALE MODEL TECHNIQUES FOR INVESTIGATION OF AIRCRAFT ANTENNA RADIATION PATTERNS.
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REPRINT: ANTIBODIES TO GAMMA-GLOBULIN IN INFANTS AND CHILDREN EXPOSED TO ISOLOGOUS GAMMA-GLOBULIN.
AD-615 678 FLD. 6

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MOTOR REACTIONS
REPRINT: POSITION OF FOUR RESPONSE VARIABLES IN A FACTOR ANALYSIS AND THEIR RELATIONSHIP TO ANXIETY AND STRESS (DIE STELLUNG VON VIER MOTORISCHEN VARIABLEN IN EINER FAKTOREN-ANALYSE UND IHRE BEZIEHUNGEN ZU ANGST UND STRESS).
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SUBMARINES
REPRINT: THE ASHERAH; A SUBMARINE FOR ARCHAEOLOGY.
AD-615 362 FLD. 5

•ARCTIC OCEAN
GAS ANALYSIS
POSTULATED ANOMALOUS DISSOLVED ATMOSPHERIC GAS CONCENTRATION IN THE ARCTIC OCEAN.
AD-615 315 FLD. 8

ICE
LONG-RANGE ICE OUTLOOK, EASTERN ARCTIC (1969).
AD-615 551 FLD. 8

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CONTROL
PUBLIC POLICY TOWARD SUBCONTRACTING.
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•ARMED FORCES(UNITED STATES)
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AD-615 699 FLD. 14

•AF AFOSR518 64
WISCONSIN UNIV MADISON DEPT OF CHEMISTRY
(AFOSR 65-0681)
AD-615 676 FLD. 7

•AF AFOSR580 64
MELLON INST PITTSBURGH PA
(AFOSR 65-0614)
AD-615 358 FLD. 7

•AF AFOSR62 11
TUFTS UNIV MEDFORD MASS
(AFOSR 65-0711)
AD-615 698 FLD. 5

•AF AFOSR62 188
NORTH DAKOTA STATE UNIV FARGO
(AFOSR 65-0710)
AD-615 357 FLD. 5

•AF AFOSR62 280
POLYTECHNIC INST OF BROOKLYN N Y DEPT OF ELECTRICAL ENGINEERING
(AFOSR 65-0638)
AD-615 394 FLD. 9

•AF AFOSR62 426
COLORADO SCHOOL OF MINES GOLDEN
(AFOSR 65-0739)
AD-615 706 FLD. 8

•AF AFOSR62 498
SAINT LOUIS UNIV MO
AD-615 621 FLD. 8

•AF AFOSR62 96
MARYLAND UNIV COLLEGE PARK
(AFOSR 65-0740)
AD-615 351 FLD. 20

•AF AFOSR62 319
SAN ANDRES UNIV LA PAZ (BOLIVIA)
F AD-615 611 FLD. 3

•AF AFOSR631 64
CALIFORNIA UNIV LA JOLLA
(AFOSR 65-0794)
AD-615 683 FLD. 20

•AF AFOSR89 64
ARIZONA UNIV TUCSON
(AFOSR 65-0585)
AD-615 439 FLD. 9

•AF EOAR62 109
NAPLES UNIV (ITALY)
(AFOSR 65-0744)
AD-615 693 FLD. 20

•AF EOAR62 27
NEWCASTLE-UPON-TYNE UNIV (ENGLAND)
(AFOSR 65-0692)
AD-615 692 FLD. 7

•AF EOAR63 21
NATIONAL UNIV OF IRELAND DUBLIN
(AFOSR 65-0738)
F AD-615 440 FLD. 20

•AF EOAR64 12
OXFORD UNIV (ENGLAND) DEPT OF PHARMACOLOGY
(AFOSR 65-0668)
F AD-615 803 FLD. 6

•AF EOAR64 2
OXFORD UNIV (ENGLAND)
(AFOSR 65-0666)
F AD-615 476 FLD. 6

•AF EOAR64 28
ROYAL INST OF TECH STOCKHOLM (SWEDEN)
(AFCRL 65-272)
F AD-615 578 FLD. 6

•AF EOAR64 31
KAROLINSKA INST STOCKHOLM (SWEDEN)
(AFOSR 65-0670)
F AD-615 628 FLD. 6

•AF EOAR64 54
ISTITUTO DOCUMENTAZIONE DELLA ASSOCIAZIONE MECCANICA ITALIANA MILAN
(AFOSR 65-0584)
AD-615 486 FLD. 5

•AF EOAR64 9
MILAN UNIV (ITALY)
(AFOSR 65-0685)
AD-615 356 FLD. 7

•AF 30 602 3399
LFE ELECTRONICS BOSTON MASS
(RADC TDR-64-496)
F AD-615 638 FLD. 9

•AFAFOSR62 39
PENNSYLVANIA STATE UNIV UNIVERSITY PARK
(AFOSR 65-0690)
AD-615 696 FLD. 20

•AFO9 647 787
LOCKHEED MISSILES AND SPACE CO SUNNYVALE CALIF
AD-615 201 FLD. 4

•AF18 600 1489
INSTITUTE FOR THE STUDY OF METALS UNIV OF CHICAGO ILL
(AFOSR 3428)
AD-615 193 FLD. 20

•AF19 604 4148
NEW HAMPSHIRE UNIV DURHAM
(AFCRL 64-889)
F AD-615 585 FLD. 4

•AF19 604 8482
LABORATORY FOR INSULATION RESEARCH MASS INST OF TECH CAMBRIDGE
AD-615 370 FLD. 20

•AF19 604 6616
WEATHER SERVICES INC BOSTON MASS
(AFCRL 65-262)
F AD-615 426 FLD. 4

•AF19 604 6691
PENNSYLVANIA STATE UNIV UNIVERSITY PARK MINERAL INDUSTRIES EXPERIMENT STATION
(AFCRL 65-35)
AD-615 697 FLD. 4

•AF19 604 7288
AMERICAN METEOROLOGICAL SOCIETY BOSTON MASS
(PB 164 294-1)
AD-615 473 FLD. 4
(PB 164 294-2)
AD-615 592 FLD. 4

•AF19 604 8382
BOLT BERANEK AND NEWMAN INC CAMBRIDGE MASS
(AFCRL 65-300)
F AD-615 639 FLD. 9

•AF19 628 1622
BOSTON COLL MASS
(AFCRL 65-190)
AD-615 724 FLD. 8

•AF19 628 1677
BASIC DEVICES INC WELLESLEY MASS
(AFCRL 64-194)
F AD-615 492 FLD. 4

•AF19 628 1680
CORNELL AERONAUTICAL LAB INC BUFFALO N Y
(AFCRL 65-209)
F AD-615 456 FLD. 14

•AF19 628 201
UTAH UNIV SALT LAKE CITY
(AFCRL 65-298)
F AD-615 479 FLD. 17

•AF19 628 2374
MICHIGAN UNIV ANN ARBOR COLL OF ENGINEERING
(AFCRL 65-184)
AD-615 368 FLD. 20
RADIATION LAB UNIV OF MICHIGAN ANN ARBOR
(AFCRL 65-294)
AD-615 538 FLD. 20

•AF19 628 2390
MITRE CORP BEDFORD MASS
(ESD TDR-64-107)
AD-615 365 FLD. 9

•AF19 628 2406 GRANT
CRUFT LAB HARVARD UNIV CAMBRIDGE MASS
(AFCRL 65-121)
AD-615 742 FLD. 9

•AF19 628 2419
PARKE MATHEMATICAL LABS INC CARLISLE MASS
(AFCRL 65-295)
AD-615 550 FLD. 18

•AF19 628 2495
TECHNICAL OPERATIONS RESEARCH BURLINGTON MASS
(ESD TDR-65-183)
F AD-615 549 FLD. 9

•AF19 628 2489
MCGILL UNIV MONTREAL (QUEBEC)

STORMY WEATHER GROUP
(AFCRL 65-241)
AD-615 383 FLD. 20

•AF19 628 291
ELECTRO-DYNAMICS LABS UTAH STATE UNIV LOGAN
(AFCRL 65-194)
AD-615 466 FLD. 20

•AF19 628 3854
MASSACHUSETTS INST OF TECH CAMBRIDGE
(AFCRL 65-201)
F AD-615 489 FLD. 4

•AF19 628 3868
COURANT INST OF MATHEMATICAL SCIENCES NEW YORK UNIV N Y
(AFCRL 65-256)
AD-615 755 FLD. 20

•AF19 628 4049
RENSSELAER POLYTECHNIC INST TROY N Y DEPT OF CHEMISTRY
(AFCRL 65-253)
F AD-615 626 FLD. 7

•AF19 628 4309
ELECTRO-OPTICAL SYSTEMS INC PASADENA CALIF
(AFCRL 65-177)
F AD-615 444 FLD. 4

•AF19 628 4337
ILLINOIS UNIV URBANA ENGINEERING EXPERIMENT STATION
(AFCRL 65-93)
AD-615 439 FLD. 20

•AF19 628 4360
GENERAL DYNAMICS/CONVAIR SAN DIEGO CALIF
(AFCRL 65-208)
AD-615 408 FLD. 20

•AF19 628 485
SYSTEM DEVELOPMENT CORP SANTA MONICA CALIF
(AFCRL 65-169)
F AD-615 660 FLD. 9

•AF19 628 489
ATMOSPHERIC RESEARCH LAB UNIV OF OKLAHOMA RESEARCH INST NORMAN
(AFCRL 65-242)
F AD-615 571 FLD. 4

•AF19 628 500
LINCOLN LAB MASS INST OF TECH LEXINGTON
(ESD TDR-64-567)
AD-615 515 FLD. 14
(ESD TDR-65-64)
AD-615 522 FLD. 9
(ESD TDR-65-67)
AD-615 523 FLD. 9
(ESD TDR-65-36)
AD-615 658 FLD. 9

•AF29 601 6352
DAVISSON (M T) FOUNDATION ENGINEER CHAMPAIGN ILL
(WL TR-64-118)
AD-615 457 FLD. 16

•AF30 602 2998
TRONETICS HOLLYWOOD CALIF
(RADC TR-64-552)
F AD-615 504 FLD. 14

•AF30 602 3016
SHOCKLEY TRANSISTOR DIV CLEVITE TRANSISTOR PALO ALTO CALIF
(RADC TR-64-524)
F AD-615 312 FLD. 9

•AF30 602 3081
SYLVANIA ELECTRONIC SYSTEMS WALTHAM MASS
(RADC TDR-64-362)
F AD-615 505 FLD. 9

•AF30 602 3243
CORNELL UNIV ITHACA N Y SCHOOL OF ELECTRICAL ENGINEERING
(RADC TR-65-22)
AD-615 756 FLD. 9

•AF30 602 3274
SIGNATRON INC LEXINGTON MASS
(RADC TR-65-10)
F AD-615 637 FLD. 17

•AF30 602 3430
UNIVAC BLUE BELL PA
(RADC TR-64-571)
F AD-615 493 FLD. 9

•AF30 602 3487
SYLVANIA ELECTRIC PRODUCTS INC WOBURN MASS SEMICONDUCTOR DIV
(RADC TR-65-31)
AD-615 498 FLD. 9

•AF33 600 39852
MITRE CORP BEDFORD MASS
(ESD TDR-65-112)
AD-615 388 FLD. 20

•AF33 600 42406
SPACE-GENERAL CORP EL MONTE CALIF
F AD-615 202 FLD. 20

•AF33 615 1104
TECHNICAL OPERATIONS RESEARCH BURLINGTON MASS
(AL TR-65-76)
AD-615 441 FLD. 7

•AF33 615 1185
ALLIS-CHALMERS MFG CO MILWAUKEE WIS
AD-615 310 FLD. 10

•AF33 615 1235
ELECTRONIC PROPERTIES INFORMATION CENTER CULVER CITY CALIF
AD-615 409 FLD. 9
AD-615 410 FLD. 9
AD-615 411 FLD. 9
AD-615 414 FLD. 9

•AF33 615 1242
TEXAS INSTRUMENTS INC DALLAS
AD-615 752 FLD. 9

•AF33 616 3414
THEORETICAL CHEMISTRY INST UNIV OF WISCONSIN MADISON
AD-615 268 FLD. 20

•AF33 616 6430
NEW YORK UNIV N Y SCHOOL OF ENGINEERING AND SCIENCE
(ARL 65-21)
F AD-615 445 FLD. 14

•AF33 616 6789
STANFORD UNIV CALIF
(ARL 65-3)
AD-615 561 FLD. 11

•AF33 616 7042
COLUMBIA UNIV NEW YORK
(ML TR-64-401)
AD-615 654 FLD. 1

•AF33 616 7132
MIAMI UNIV OXFORD OHIO
(AMRL TR-65-16)
F AD-615 376 FLD. 5

•AF33 616 7236
BATTELLE MEMORIAL INST COLUMBUS OHIO
(ARL 65-64)
AD-615 558 FLD. 7

•AF33 616 7877
MINNESOTA UNIV MINNEAPOLIS
(ARL 65-12)
F AD-615 460 FLD. 20

•AF33 616 8438
ELECTRONIC PROPERTIES INFORMATION CENTER CULVER CITY CALIF
AD-615 409 FLD. 9
AD-615 410 FLD. 9
AD-615 411 FLD. 9
AD-615 414 FLD. 9

•AF33 616 8483
CINCINNATI UNIV OHIO
(ARL 65-50)
AD-615 326 FLD. 1

•AF33 657 10085
RADIATION EFFECTS INFORMATION CENTER COLUMBUS OHIO
AD-615 739 FLD. 18

•AF33 657 10437
EASTMAN KODAK CO ROCHESTER N Y APPARATUS AND OPTICAL DIV
(SEG TR-65-13)
F AD-615 619 FLD. 14

•AF33 657 10475
MINNESOTA UNIV MINNEAPOLIS PHYSICAL ELECTRONICS RESEARCH LAB
AD-615 311 FLD. 9

•AF33 657 10763
LABORATORY OF AVIATION PSYCHOLOGY OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS
(AMRL TR-65-25)
F AD-615 758 FLD. 5

•AF33 657 10933
JET PROPULSION CENTER PURDUE UNIV LAFAYETTE IND
(ARL 65-54)
F AD-615 462 FLD. 20

•AF33 657 11287
HUGHES AIRCRAFT CO CULVER CITY CALIF
(ML TDR-64-299)
AD-615 600 FLD. 11

•AF33 657 11607
RCA SERVICE CO INC CAMDEN N J
(AMRL TR-65-32)
F AD-615 436 FLD. 12

•AF33 657 11679
GENERAL DYNAMICS/CONVAIR SAN DIEGO CALIF
(FDL TR-64-187)
F AD-615 471 FLD. 1

•AF33 657 7381
VIDYA DIV ITEK CORP PALO ALTO CALIF
(AFCRL 65-197)
F AD-615 434 FLD. 17

•AF33 657 7636
OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS
(ML TR-65-116)
F AD-615 636 FLD. 11

•AF33 657 7774
CORNELL AERONAUTICAL LAB INC BUFFALO N Y
(ARL 65-47)
AD-615 461 FLD. 14

•AF33 657 8286
POLYTECHNIC INST OF BROOKLYN N Y
(ARL 65-65)
AD-615 608 FLD. 1

•AF33 657 8860
CORNELL AERONAUTICAL LAB INC

BUFFALO N Y
(ARL 69-6)
AD-615 385 FLD. 1

•AF33 697 8867
MICHIGAN UNIV ANN ARBOR
(ARL 69-59)
F AD-615 559 FLD. 20

•AF33 697 9033
RADIATION INC MELBOURNE FLA
(AL TDR-64-206)
F AD-615 548 FLD. 17

•AF33 697 9158
ITEK CORP WALTHAM MASS
AD-615 647 FLD. 14
AD-615 648 FLD. 14

•AF33 697 9962 GRANT
PRINCETON UNIV N J
(ARL 69-73)
AD-615 960 FLD. 20

•AF41 609 1989
SPACE AND INFORMATION SYSTEMS DIV NORTH AMERICAN AVIATION INC DOWNEY CALIF
(AAL TDR-64-20)
AD-615 490 FLD. 6

•AF49 638 1144
ARA INC WEST COVINA CALIF
(AFOSR 65-0420)
F AD-615 653 FLD. 20

•AF49 638 1280
STANFORD UNIV CALIF
AD-615 597 FLD. 1

•AF49 638 1321
MICROWAVE LAB STANFORD UNIV CALIF
(AFOSR 64-2494)
AD-615 553 FLD. 20

•AF49 638 1355
LAMONT GEOLOGICAL OBSERVATORY PALISADES N Y
AD-615 623 FLD. 8

•AF49 638 1389
HIGH ENERGY PHYSICS LAB STANFORD UNIV CALIF
AD-615 500 FLD. 20

•AF49 638 1402
MICROWAVE RESEARCH INST POLYTECHNIC INST OF BROOKLYN N Y
(AFOSR 65-0514)
AD-615 545 FLD. 9
AD-615 546 FLD. 9
AD-615 576 FLD. 9

•AF49 638 1462
CALIFORNIA INST OF TECH PASADENA
(AFOSR 65-0726)
AD-615 630 FLD. 20

•AF49 638 1468
NATIONAL MAGNET LAB MASS INST OF TECH CAMBRIDGE
(AFOSR 65-0606)
AD-615 364 FLD. 20

•AF49 638 700
RAND CORP SANTA MONICA CALIF
AD-615 261 FLD. 15
AD-615 262 FLD. 20
AD-615 263 FLD. 15
AD-615 319 FLD. 5
AD-615 320 FLD. 20
AD-615 321 FLD. 5
AD-615 655 FLD. 13
AD-615 656 FLD. 13
AD-615 657 FLD. 8
AD-615 663 FLD. 12
AD-615 712 FLD. 20

•AF49 638 729
BUREAU OF SOCIAL SCIENCE RESEARCH INC WASHINGTON D C
(AFOSR 65-0977)
AD-615 363 FLD. 5

•AF49 638 792
CORNELL AERONAUTICAL LAB INC BUFFALO N Y
(ARL 69-6)
AD-615 385 FLD. 1

•AF49 638 980
MELLON INST PITTSBURGH PA
(AFOSR 4709)
S AD-615 666 FLD. 7

•AF49 638 980 GRANT
MELLON INST PITTSBURGH PA
(AFOSR 65-0979)
F AD-615 438 FLD. 20

•AF61 052 398
LOUVAIN UNIV (BELGIUM)
(ARL 65-119)
F AD-615 562 FLD. 7

•AF61 052 483
IOWA STATE UNIV IOWA CITY
(AFOSR 65-0894)
AD-615 360 FLD. 5

•AF61 052 524
MANCHESTER UNIV (ENGLAND) DEPT OF ASTRONOMY
(AFCRL 65-328)
AD-615 367 FLD. 3

•AF61 052 527
CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE VERRIERES-LE-BUISSON (FRANCE) SERVICE
(AFCRL 65-284)
F AD-615 455 FLD. 4

•AF61 052 587
LIEGE UNIV (BELGIUM)
(AFCRL 65-304)
AD-615 403 FLD. 3

•AF61 052 621
WEIZMANN INST OF SCIENCE REHOVOTH (ISRAEL)
F AD-615 646 FLD. 20

•AF61 052 694
WEIZMANN INST OF SCIENCE REHOVOTH (ISRAEL)
AD-615 587 FLD. 20
AD-615 589 FLD. 20
A AD-615 590 FLD. 20
AD-615 644 FLD. 20
AD-615 645 FLD. 7

•AF61 052 697
INSTITUTO GEOGRAFICO Y CATASTRAL MADRID (SPAIN)
AD-615 728 FLD. 8

•AF61 052 698
MARBURG UNIV (WEST GERMANY) INSTITUT FUER THEORETISCHE PHYSIK
(AFOSR 65-0651)
AD-615 691 FLD. 20

•AF61 052 729
TECHNISCHE HOCHSCHULE MUNICH (WEST GERMANY) ELEKTROPHYSI KALISCHES INSTITUT
(AFCRL 65-269)
AD-615 491 FLD. 14

•AF61 052 778
MUNICH UNIV (WEST GERMANY) METEOROLOGISCHES INSTITUT
(AFCRL 65-268)
A AD-615 527 FLD. 4

•AF61 052 780
QUEEN'S UNIV BELFAST (NORTHERN IRELAND) DEPT OF APPLIED MATHEMATICS
(AFCRL 65-294)
AD-615 443 FLD. 20

•AF64 500 8
DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH WELLINGTON (NEW ZEALAND) PHYSICS AND
(AFCRL 65-264)
F AD-615 465 FLD. 20

•ARDS965
AIRBORNE INSTRUMENTS LAB DEER PARK N Y
(SRDS RD-65-5)
F AD-615 419 FLD. 1

•AROD31 1246300
RUTGERS -THE STATE UNIV NEW BRUNSWICK N J COLL OF ENGINEERING
(AROD 3560:7)
AD-615 699 FLD. 20

•AT30 1 1842
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
AD-615 324 FLD. 9

•CWB10938
MARINE LAB UNIV OF MIAMI CORAL GABLES FLA
F AD-615 499 FLD. 4

•DA AMC49 177 6368
VIRGINIA POLYTECHNIC INST BLACKSBURG
(TRECOM TR-64-51)
AD-615 482 FLD. 15

•DA AROD31 1246960
FLORIDA UNIV GAINESVILLE RADIO OBSERVATORY
(AROD 2083:28)
AD-615 686 FLD. 3

•DA ARO49 093 64638
LA PLATA UNIV (ARGENTINA) INST OF PHYSIOLOGY
F AD-615 575 FLD. 6

•DA ARO49 093 64639
UNIVERSIDAD CATOLICA DE CHILE SANTIAGO LABORATORIO DE FISIOLOGIA
F AD-615 574 FLD. 6

•DA MD49 193 646136
ZARET FOUNDATION INC SCARSDALE N Y
A AD-615 469 FLD. 6

•DA04 2000RD1166X
SHOCKLEY LAB ITT SEMICONDUCTOR PALO ALTO CALIF
(AROD 3330:3)
AD-615 675 FLD. 20

•DA11 0220RD3059
MATHEMATICS RESEARCH CENTER UNIV OF WISCONSIN MADISON
AD-615 746 FLD. 12

•DA11 0220RD3525
ILLINOIS UNIV URBANA DEPT OF PHYSICS
(AROD 2694:3)
AD-615 674 FLD. 7

•DA11 0220RD3442
ILLINOIS UNIV URBANA DEPT OF PHYSICS
(AROD 2694:3)
AD-615 674 FLD. 7

•DA11 0220RD2059
MATHEMATICS RESEARCH CENTER UNIV OF WISCONSIN MADISON
AD-615 744 FLD. 12
AD-615 745 FLD. 12

•DA18 035AMC107A
ATOMICS INTERNATIONAL CANOGA PARK CALIF
AD-615 343 FLD. 18

•DA18 039AMC299A
AMERICAN CHEMICAL SOCIETY
OHIO STATE UNIV COLUMBUS
F AD-615 488 FLD. 5

•DA18 064AMC48A
TENNESSEE UNIV KNOXVILLE
AD-615 304 FLD. 6

•DA28 043AMC00030E
HONEYWELL INC HOPKINS MINN
AD-615 330 FLD. 10

•DA28 043AMC00092E
HUGHES AIRCRAFT CO NEWPORT BEACH CALIF
AD-615 542 FLD. 9

•DA28 043AMC00151E
BOLT BERANEK AND NEWMAN INC
CAMBRIDGE MASS
AD-615 407 FLD. 17

•DA28 043AMC00164E
IIT RESEARCH INST CHICAGO ILL
(ECOM 00614-2)
AD-615 526 FLD. 17

•DA28 043AMC00221E
EAGLE-PICHER CO JOPLIN MO
AD-615 342 FLD. 10

•DA28 043AMC00226E
IIT RESEARCH INST CHICAGO ILL
AD-615 627 FLD. 9

•DA28 043AMC00278E
MOTOROLA INC PHOENIX ARIZ
SEMICONDUCTOR PRODUCTS DIV
(ECOM 00278-2)
AD-615 329 FLD. 9

•DA31 124ARO 033
FIRESTONE FLIGHT SCIENCES LAB CALIF INST OF TECH PASADENA
AD-615 207 FLD. 1

•DA31 124AROD128
HARVARD UNIV CAMBRIDGE MASS
AD-615 689 FLD. 12

•DA31 124AROD148
CLEMSON UNIV S C ENGINEERING EXPERIMENT STATION
(AROD 4390:1)
AD-615 573 FLD. 1

•DA31 124ARORD17
PURDUE RESEARCH FOUNDATION
LAFAYETTE IND
AD-615 569 FLD. 20

•DA36 039ORD3347RD
INSTITUTE FOR COOPERATIVE RESEARCH UNIV OF PENNSYLVANIA PHILADELPHIA
F AD-615 337 FLD. 9

•DA36 039AMC00064E
RAYTHEON CO WALTHAM MASS
RESEARCH DIV
F AD-615 734 FLD. 9

•DA36 039AMC01471E
CLEVITE CORP BEDFORD OHIO
AD-615 760 FLD. 9

•DA36 039AMC01478E
CORNELL-DUBILIER ELECTRONICS DIV FEDERAL PACIFIC ELECTRIC CO NORWOOD MASS
AD-615 543 FLD. 9

•DA36 039AMC01481E
BERYLLIUM CORP READING PA
AD-615 412 FLD. 9

•DA36 039AMC02227E
BELL TELEPHONE LABS INC MURRAY HILL N J
AD-615 584 FLD. 9

•DA36 039AMC02284E
GENERAL TELEPHONE AND ELECTRONICS LABS INC BAYSIDE N Y
AD-615 328 FLD. 9

•DA36 039AMC02300E
GENERAL TELEPHONE AND ELECTRONICS LABS INC BAYSIDE N Y
(ECOM 02300-7)
AD-615 341 FLD. 20

•DA36 039AMC02347E
ADVANCED TECHNOLOGY CORP
TIMONIUM MD
AD-615 743 FLD. 9

•DA36 039AMC02362E
RAYTHEON CO WALTHAM MASS
RESEARCH DIV
F AD-615 555 FLD. 20

•DA36 039AMC03200E
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
AD-615 324 FLD. 9

•DA36 039AMC03205E
WESTINGHOUSE RESEARCH LABS PITTSBURGH PA
F AD-615 748 FLD. 9

•DA36 039AMC03630E
CORNELL-DUBILIER ELECTRONICS DIV FEDERAL PACIFIC ELECTRIC CO NORWOOD MASS
AD-615 344 FLD. 9

•DA36 039SC81294
WESTERN ELECTRIC CO LAURELDALE PA
F AD-615 537 FLD. 9

•DA36 039SC85964
BURNDY CORP NORWALK CONN
AD-615 323 FLD. 9

•DA36 039SC86718
MICROWAVE ASSOCIATES INC BURLINGTON MASS
F AD-615 747 FLD. 9

•DA36 039SC89205
BELL TELEPHONE LABS INC MURRAY HILL N J
AD-615 382 FLD. 9

•DA360340RD3347A
INSTITUTE FOR COOPERATIVE RESEARCH UNIV OF PENNSYLVANIA PHILADELPHIA
F AD-615 337 FLD. 9

•DA49 177AMC292T
BELL HELICOPTER CO FORT WORTH TEX
(TRECOM TR-65-22)
F AD-615 464 FLD. 1

•DA49 146XZ124
JOHN B PIERCE FOUNDATION OF CONNECTICUT NEW HAVEN
(DASA 1566)
AD-615 477 FLD. 6
(DASA 1568)
AD-615 479 FLD. 6

•DA49 146XZ124 GRANT
JOHN B PIERCE FOUNDATION OF CONNECTICUT NEW HAVEN
(DASA 1567)
AD-615 478 FLD. 6

•DA49 146XZ198
LOCKHEED MISSILES AND SPACE CO PALO ALTO CALIF PHYSICAL SCIENCES LAB
AD-615 690 FLD. 20

•DA49 193MD1101
TUFTS UNIV BOSTON MASS SCHOOL OF MEDICINE
AD-615 703 FLD. 6

•DA49 193MD2081
TUFTS UNIV BOSTON MASS SCHOOL OF MEDICINE
AD-615 703 FLD. 6

•DA49 193MD2379
JOHNS HOPKINS UNIV BALTIMORE MD SCHOOL OF MEDICINE
AD-615 671 FLD. 6

•DRB8865 04
TORONTO UNIV (ONTARIO)
AD-615 672 FLD. 6

•FA WA4977
MONSANTO RESEARCH CORP DAYTON OHIO
(SRDS 65-13)
F AD-615 420 FLD. 1

•FAA WA4299
SOUTHERN CALIFORNIA LABS STANFORD RESEARCH INST SOUTH PASADENA
F AD-615 483 FLD. 1

•FA64WA5139
INSTRUMENTATION LAB MASS INST OF TECH CAMBRIDGE
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OTHER RESEARCH REPORTS AND RELATED MATERIAL

*Descriptors marked with an asterisk are included in the subject index

01. Aeronautics

AD-451 128 Field 01A, 14B
CFSTI Price: HC$2.00

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
EFFECT OF SHOCK IMPINGEMENT ON THE HEAT-TRANSFER AND PRESSURE DISTRIBUTIONS ON A CYLINDRICAL-LEADING-EDGE MODEL AT MACH NUMBER 19,
by L. G. Siler and H. E. Deskins. Nov 64, 30p
AEDC TDR-64-228
Contract AF40 600 1000, Proj. VT0424, Task 136607
Unclassified report

Descriptors: (*Aerodynamic configurations, Cylindrical bodies), (*Wind tunnel models, Cylindrical bodies), Hypersonic wind tunnels, Shock waves, Reynolds number, Pressure, Heat transfer.

Pressure and heat-transfer measurements on a cylindrical-leading-edge model with and without the influence of an impinging shock wave were made in Tunnel F at about Mach number 19 and Reynolds number of approximately 24,000 per inch. The configuration was evaluated through a sweep range from 0 to 75 deg while varying the shock generator angle from 0 to 40 deg. (Author)

N65-19276 Field 01B, 01C
CFSTI Prices: HC$2.00 MF$0.50

National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
EFFECTS OF AIRCRAFT RELATIVE DENSITY ON SPIN AND RECOVERY CHARACTERISTICS OF SOME CURRENT CONFIGURATIONS,
by William D. Grantham and Sue B. Grafton.
Mar 65, 40p NASA-TN-D-2243
Unclassified report

Descriptors: (*Aircraft, Configuration), (*Aerodynamic characteristics, Aircraft), Spin, Recovery.

N65-19279 Field 01A, 01C
CFSTI Pices: HC$2.00 MF$0.50

National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
A STUDY OF PRESSURE AND HEAT TRANSFER OVER AN 80 DEGREE SWEEP SLAB DELTA WING IN HYPERSONIC FLOW,
by Allen H. Whitehead, Jr. and James C. Dunavant.
Mar 65, 50p NASA-TN-D-2708
Unclassified report

Descriptors: (*Delta wings, Hypersonic characteristics), (*Hypersonic characteristics, Delta wings), Aerodynamic heating, Pressure.

N65-19280 Field 01C, 12A, 20K
CFSTI Prices: HC$2.00 MF$0.50

National Aeronautics and Space Administration, Langley Station, Va., Langley Research Center.
TECHNIQUES FOR EXAMINING STATISTICAL AND POWER-SPECTRAL PROPERTIES OF RANDOM TIME HISTORIES,
by Herbert A. Leybold. Mar 65, 45p
NASA-TN-D-2714
Unclassified report

Descriptors: (*Airframes, Loading (Mechanics)), (*Loading (Mechanics), Statistical analysis).

Patent 3,176,941 Field 01B

LOAD UNLOCKING AND ACTUATING THRUSTER.
Patent assigned to Army,
by Gilbert H. Skopp and Charles W. Boaz. 6 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Jettisonable equipment, Explosive actuators), (*Locking fastener devices, Parachutes), Patents.

The thruster is operable sequentially to unlock and actuate a load device such as the main parachute of an aircraft escape system. A drogue parachute is locked to the container of the main parachute by two pins. The thruster is movable in its entirety to actuate the pins and the pilot parachute.

PB-167 270 Field 01B, 13F
CFSTI Prices: HC$3.00 MF$0.75

Institute for Aerospace Studies, Univ. of Toronto (Ontario).
EXPERIMENTAL STUDY OF THE AERODYNAMIC CHARACTERISTICS OF A MODEL OF AN AIR CUSHION VEHICLE IN HOVERING FLIGHT,
by B. W. Gowans. Feb 64, 78p
Technical note no. UTIAS-TN-74
Contract AF33 657 8451
AD 446 189
Unclassified report

Descriptors: (*Ground effect machines, Model tests), Aerodynamic characteristics, Hovering, Flight testing, Construction, Instrumentation, Calibration, Pitch, Ground effect, Ducted fans, Shrouded propellers, Gas flow, Pressure, Thrust, Lift, Performance (Engineering), Three-dimensional flow, Mathematical analysis.

A self-propelled model of an Air Cushion Vehicle has been built and flight tested on the UTIAS Circular Track Facility. A detailed study of the flow through the model has been made, and the jet mass and momentum fluxes have been measured. An augmentation curve and the basic static and dynamic stability characteristics in pitch have been obtained for the model while in hovering flight. (Author)

PB-167 432 Field 01A, 01C
CFSTI Prices: HC$3.00 MF$0.75

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
THE AERODYNAMIC APPRAISAL OF STOL/VTOL CONFIGURATIONS,
by R. J. Vidal, A. Sowyrda, and R. A. Hartunian.
Jun 60, 88p Rept. no. AI-1190-A-4
Contract DA44 177tc439, Proj. 9 38 01 000, Task 902
AD 241 271
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Aerodynamic configurations, Short take-off planes), (*Lift, Short take-off planes), (*Short take-off planes, Aerodynamic characteristics), (*Vertical take-off planes, Aerodynamic characteristics), Perturbation theory, Jet flaps, Aspect ratio, Angle of attack, Jets, Deflection, Vortices, Hovering, Wake, Jet propulsion.

Methods for estimating the characteristics of different STOL/VTOL configurations are discussed, with special emphasis given to the effect of interactions between the lifting system and the propulsion wake. The results of a small perturbation theory for the finite high aspect-ratio jet flap are presented. The results of the theory are found to be in good agreement with experiment over a wide range of aspect ratios, angles of attack, jet deflections, and jet momentum coefficients. Certain aspects of the deflected slipstream configuration have been treated, and it is concluded that the classical model of a tubularpropulsive jet cannot be physically realized. The velocity gradients due to the wing alter the solenoidal vortices defining the jet to form secondary or trailing vortices on the jet boundary. The implications of this final wake configuration and the rolling-up process are discussed. The effect of vertical gradients of velocity present in a propeller slipstream are discussed, and the theoretical and experimental results for the two-dimensional case show that there is an interaction effect associated with the slipstream velocity gradients and thewing thickness and camber which results in increased lift. (Author)

PB-167 465 Field 01A
CFSTI Prices: HC$1.00 MF$0.50

Johns Hopkins Univ., Baltimore, Md.
REVIEW OF SOME RECENT ADVANCES IN THE UNDERSTANDING OF TRANSITION FROM LAMINAR TO TURBULENT SHEAR FLOWS,
by M. V. Morkovin. Oct 57, 24p
Contract AF18 600 1121
AFOSR TN-57-638; AD 136 626
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Boundary layer transition, Reviews), (*Reviews, Boundary layer transition), Laminar flow, Turbulence.

02. Agriculture

No entries

03. Astronomy and Astrophysics

N65-18975 Field 03A
CFSTI Prices: HC$1.00 MF$0.50

National Aeronautics and Space Administration, Greebelt, Md. Goddard Space Flight Center.
ON THE GENERAL PERTURBATIONS OF THE POSITION VECTORS OF A PLANETARY SYSTEM,
by Peter Musen. Mar 65, 25p Unclassified report
NASA-TN-D-2692

Descriptors: (*Planets, Perturbation theory), (*Perturbation theory, Planets), Vector analysis.

PB-167 099 Field 03B, 12A
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
THE EQUILIBRIUM FIGURES OF THE EARTH AND THE PLANETS,
by Zdenek Kopal and Richard James. Oct 60, 21p
Technical summary rept. no. MRC-TSR-193
Contract DA11 022ORD2059 Unclassified report
AD 247 405

Descriptors: (*Planets, Distortion), (*Rotation, Planets), (*Earth, Distortion), Jupiter, Saturn, Earth models, Moment of inertia, Density, Gravity, Potential theory, Configuration, Differential equations.

The form, exterior potential, and moments of inertia of the terrestrial globe as influenced by its axial rotation were determined correctly to quantities of second order in superficial distortion, assuming the Earth to be in perfect hydrostatic equilibrium, on the basis of both standard and minimum distribution of density inside the Earth as deduced from the seismological evidence by Bullen (Bull. Seism. Soc. Amer. 30:235, 1940; 32:19, 1942). The outcome of computations reveals that Bullen's standard model of the Earth's interior (characterized by a density discontinuity at the interface of the inner core) is perfectly compatible with the terrestrial oblateness, as well as with the properties of the external gravitational field of our planet or its moments of inertia, as deduced from geodetic measurements and by astronomical methods. If the Earth is in perfect hydrostatic equilibrium, the observed reciprocal of its ellipticity would correspond to a central density = 17.5 ± 0.4 g/cc; the minimum vales as low as 12-13 g/cc being completely ruled out. One investigation was extended to a similar study of all consequences of the rotational distortion of the planets Jupiter and Saturn, on the basis of their models of internal structure worked out recently by de Marcus (A. J., 63:2, 1958). These planets are known to rotate so fast that the second-order effects of centrifugal force become of much greater relative importance than is the case for the Earth. The results of the computations are found to be in satisfactory agreement with the observed facts; and the underlying assumption of the mass of these planets being in hydrostatic equilibrium seems again to confirmed as well as could be expected. (Author)

04. Atmospheric Sciences

AD-446 905 Field 04B, 08F
CFSTI Price: HC$1.00

Army Cold Regions Research and Engineering Lab., Hanover, N. H.

GROUND TEMPERATURE OBSERVATIONS BIG DELTA, ALASKA,
by G. W. Aitken. May 64, 22p
Technical rept. no. TR-104
Unclassified report

Descriptors: (*Arctic regions, Climatology), (*Earth, Temperature), Freezing, Soils, Alaska, Permafrost.

Summaries are presented of (1) ground temperature data at 9 depths from 0.0-22.0 ft collected daily at Big Delta (Alaska) during 1947-60, (2) comparative climatological data collected by the U. S. Weather Bureau, and (3) soil data from samples obtained in June 1946 and May 1962. Tables are given of (1) the mean or average climatological data, (2) the maximum, minimum, and average ground temperatures for the 13 1/2 years as determined from data recorded on the first day of each month, and (3) the ground temperatures recorded the first day of each month during the 1947-60 period. Ground-temperature gradients for a typical thaw and freeze season (1951) are graphed and the maximum and minimum temperatures recorded at each depth are also presented. The average season depth of freeze was approximately 14 ft. The data show that there is no permafrost at the temperature-well location to a depth of 22.5 ft. (Author)

AD-450 704 Field 04B
CFSTI Price: HC$3.00

Polytechnic Inst. of Brooklyn, N. Y.
ON THE MOTION AND DECAY OF A VORTEX IN A NON-UNIFORM STREAM.
Final rept.,
by Lu Ting and Chee Aug 64, 63p
Rept. no. PIBAL-851 Unclassified report
Grant WBG24

Descriptors: (*Vortices, Incompressible flow), Two-dimensional flow, Partial differential equations, Reynolds number, Axially symmetric flow, Non-equilibrium flow, Power series, Air mass analysis.

A systematic procedure is presented for the study of the motion of a vortex in a two-dimensional incompressible non-uniform stream as solutions of the Navier-Stokes equations by the introduction of a small parameter E which is inversely proportional to the square root of the Reynolds number of the vortex. Two different sets of length and time scales are introduced. The set with longer length and time scales are identified with the typical scales of the outer non-uniform flow. The ratio of the two length scales and that of the time scales are powers of the small parameter E. By the expansion of the solutions in power of E with appropriate time and length scales, it is shown that the outer solution of the Navier-Stokes equations will be the same as the inviscid solution while the leading term in the inner solution agrees with that of a decaying axially symmetric vortex.

AD-451 313 Field 04B, 08F
CFSTI Price: HC$1.00

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
GROUND TEMPERATURE OBSERVATIONS, NORTHWAY, ALASKA,
by George W. Aitken. Oct 64, 21p
Technical rept. no. TR-107
Unclassified report

Descriptors: (*Arctic regions, Climatology), (*Earth, Temperature), Soils, Resistance thermometers, Temperature, Alaska, Permafrost, Freezing.

Summaries are presented of (1) ground temperature data at 9 depths from 0.0-20.0 ft collected daily at Northway (Alaska) during 1952-60, (2) comparative climatological data collected by the U. S. Weather Bureau for the years 1952-1961, and (3) soil data from samples obtained in September 1952 and October 1961. Tables are given of (1) the mean or average climatological data, (2) the maximum, minimum, and average ground temperatures for the 11 years as determined from data recorded on the first day of each month, and (3) the ground temperatures recorded the first day of each month during the 1952-60 period. Ground-temperature gradients for a typical thaw and freeze season (1954-55) are graphed and the maximum and minimum temperatures recorded at each depth are also presented. The depth to permafrost was about 4.5 feet. The layer of summer thaw refroze completely down to permafrost each year during the observational period. (Author)

PB-167 324 Field 04A, 04B
CFSTI Prices: HC$2.00 MF$0.50

Travelers Research Center, Inc., Hartford, Conn.
RELATIONSHIPS BETWEEN TROPICAL PRECIPITATION AND KINEMATIC CLOUD MODELS.
Progress rept. no. 6, 1 Feb-31 Jul 64,
by Geirmundur Arnason and Edward A. Newburg.
31 Jul 64, Rept. no. 7448-145
Contract DA36 039SC89099, Proj. 3A99 27 005
AD 450 231; N65 14716
Unclassified report

Descriptors: (*Atmosphere models, Meteorological phenomena), (*Meteorological phenomena, Atmosphere models), Tropical regions, Convection, Clouds, Atmospheric precipitation, Correlation techniques, Mechanics.

The theory of moist convection, including formation of cloud and precipitation, is formulated. The formulation assumes a model atmosphere initially at rest and bounded vertically by two rigid horizontal planes and laterally by rigid vertical planes. The initial state is composed of a basic state, and temperature and pressure perturbations superposed on the basic state. It is assumed that at all times at any given level, perturbations in pressure, temperature, and density are small compared with the initial values of these elements. If the temperature perturbation is specified initially, then the pressure perturbation may not be prescribed but is determined by means of a diagnostic differential equation relating pressure to temperature and wind. The thermodynamic equation pertinent to the convection problem takes into account heat released through condensation, cooling associated with precipitation falling through unsaturated air, and turbulent diffusion. The continuity equations for water vapor, water in cloud, and precipitation include source terms expressing the bulk effects of the microphysics of cloud and precipitation. (Author)

PB-167 381 Field 04A, 04B
CFSTI Prices: HC$4.00 MF$1.00

Air Force Cambridge Research Labs., Bedford, Mass.
PROJECT FIREFLY, VOLUME IV.
Research rept.,
ed by D. Golomb. Aug 62, 139p AFCRL 62-826
Proj. 7635
AD 291 928 Unclassified report

Descriptors: (*Atmospheric motion, Transport properties), (*Upper atmosphere, Diffusion), (*Chemicals, Atmospheric motion), Clouds, Electrons,

Simulation, Chemical properties, Physical properties, Gases, High altitude, Ionosphere, Photometers, Spectroscopy, Computer logic, Explosion effects, Luminescence, Solar radiation, Electron density, Wave transmission, Sounding rockets, Turbulence, Scattering.

Past and future Firefly experiments (the release of chemicals into the upper atmosphere) are further analyzed. The initial expansion to ambient pressure of explosive releases is treated by Brode's blast wave theory. Upper atmosphere wind, wind shear, molecular and turbulent diffusion studies are summarized. The propagation models of artificial electron clouds are reexamined. Missile trail phenomena and their relationship to some Firefly experiments are discussed. Computer solutions are obtained for diffusion-chemical kinetics equations relating to various releases. (Author)

PB-167 398 Field 04C
CFSTI Prices: HC$3.00 MF$0.75

Schjeldahl (G. T.) Co., Northfield, Minn.
SUPERPRESSURE BALLOONS.
Final rept.,
by R. J. Slater. 30 Jun 59, 100p
Contract AF19 604 3901
AFCRC TR-59-258; AD 217 825
Unclassified report

Continuation of Contract AF19 604 2286.

Descriptors: (*Meteorological balloons, Polyester plastics), (*Polyester plastics, Meteorological balloons), Design, Manufacturing methods, Environmental tests, Spheres, Cylindrical bodies, Geometric forms, Tracking, Packaging, Balloon equipment, Mechanical drawings, Flight testing.

The technical report covers the extension of engineering and design work, environmental testing, and prototype balloon flights of 'Mylar' super-pressure balloons for long duration constant altitude. The first part of this study is concerned with the cold chamber testing of super-pressure cylinder and spherical balloons and the attachment of load fittings. Also included are design modifications in the tailored-gore spherical balloon. Prototype balloon flights were made with one-mil cylinder-shaped balloons and 1-1/2-mil tetrahedral-shaped balloons with a high degree of success. Four of the flights were tracked from 24 hours to 150 hours of instrumented flight at ceiling with no measured altitude changes. In each case the flights were terminated by load cut-down or the signal was lost. Two spherical balloons and two tetrahedral balloons were built for flight testing in the near future with instruments to measure internal and external balloon temperatures and pressures. (Author)

PB-167 435 Field 04B, 08L
CFSTI Prices: HC$2.00 MF$0.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
A STUDY OF ICE FOG AND ICE-FOG NUCLEI AT FAIRBANKS, ALASKA, PART 1,
by Motoi Kumai. Aug 64, 33p
Research rept. no. RR-150
Proj. 5B, Task 8X9 27 001 03
AD 451 667
Unclassified report

Descriptors: (*Ice fog, Arctic regions), (*Nucleation, Ice fog), Cold weather tests, Crystals, Alaska, Spheres, Drops, Supercooling, Combustion products, Army research, Snow, Greenland, Sublimation, Water vapor, Electron microscopy, Evaporation, Electron diffraction analysis, Sintering, Atmospheric precipitation, Atmospheric condensation.

This study of arctic whiteout presents the results of condensation nuclei counts; identification of nuclei in fog, supercooled fog, and ice crystals; and the measurement of concentrations and liquid-water contents of ice-fog crystals. Ice fog occurred at temperatures of -37C or lower only over the populated area of Fairbanks. The crystals formed at -40C were predominantly spherical (2 to 15-mu in diam.), the remainder being hexagonal and columnar (5 to 30-mu diam.). It is suggested that spherical shapes were formed by the freezing of supercooled fog droplets, growing into hexagonal forms by sublimation of water vapor. Sintering of ice fog crystals was found even at a temperature of -40C in ice fog. The residues of ice-fog crystals, supercooled fog droplets and ice crystals were examined with an electron microscope and diffraction method to investigate their nucleation. The nuclei substances and their sizes differed from those of snow crystals on the Greenland Ice Cap and were mainly combustion by-products of 0.1 to 3-mu diameter. (Author)

PB-167 497 Field 04B
CFSTI Prices: HC$3.00 MF$0.75

Michigan Univ., Ann Arbor. Coll. of Engineering.
AN INVESTIGATION OF ATMOSPHERIC TURBULENT TRANSFER PROCESSES OVER WATER. REPORT NUMBER TWO: DATA, 1963 AND 1964.
Final rept.,
by Floyd C. Elder. Feb 65, 78p Rept. no. 05982-1-F
Contract Cwb10714, Proj. 05982
Unclassified report

Continuation of Contract Cwb10591.
See also AD-433 832.

Descriptors: (*Atmospheric motion, Marine meteorology), (*Marine meteorology, Atmospheric motion), Meteorological instruments, Meteorological data, Wind, Temperature, Dew point.

Wind speed, temperature, and dew point were measured at eight heights up to 16 meters on the U. S. Lake Survey Lake Michigan Research Tower during September and October, 1963, and during August, 1964. Wave height spectra were measured during several days of August, 1964. The Research Tower was located in water fifty feet deep, one mile from shore near Muskegon, Michigan. Edited data are presented in both tabular and graphical form. Brief descriptions of the methods used for measurement are included. (Author)

05. Behavioral and Social Sciences

AD-275 505 Field 05I
CFSTI Prices: HC$3.00

Office of Naval Research, Washington, D. C.
TRI-SERVICE CONFERENCE ON THE ROLE OF JOB EVALUATION TECHNIQUES IN THE STRUCTURING OF MILITARY OCCUPATIONS.
26 Apr 61, 53p Symposium rept. no. ACR-71
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Military personnel, Job analysis), Symposia, Scientific personnel, Air Force personnel, Army personnel, Naval personnel, Officer personnel.

Contents:
Recent developments and current practices in the evaluation of management positions, by R. C. Smyth
Recent developments and current practices in the evaluation of blue-collar jobs, by E. J. McCormick
Recent developments and current practices in the evaluation of scientific and high-level technical jobs, by H. A. Edgerton
Marine Corps billet evaluation system: its development and use, by H. D. Fredericks
Air Force research on job evaluation procedures, by R. E. Christal and J. M. Madden
Current system of army job evaluation, by H. I. Hadley
Naval techniques for establishing rates and pay grades, by C. C. Schuller
Air Force job evaluation practices, by O. E. Abel.

AD-400 122 Field 05D, 05C
CFSTI Price: HC$2.00

RAND Corp., Santa Monica, Calif.
SOVIET DOCTRINE ON DEVELOPING COUNTRIES: SOME DIVERGENT VIEWS,
by Herbert S. Dinerstein. Mar 63, 30p
Rept. no. P-2725
Unclassified report

For presentation at the International Conference on World Politics (4th), held in Athens, Greece, 17-22 Sep 62.

Descriptors: (*USSR, Foreign policy), Political science, Communism, Egypt, Cuba, Economics, Propaganda.

It seems unlikely that the Soviet Union will undertake any large new commitments to extend economic aid to underdeveloped countries that have not so far received such help. It may reduce its commitment to Egypt after completing the much publicized Aswan High Dam. If Moscow heeds the questioning voices now being raised in the USSR, its tendency may well be to concentrate its assistance on rather backward and small countries where modest investments can produce political changes favorable to the extension of Soviet power.

AD-427 733 Field 05C
CFSTI Price: HC$4.00

RAND Corp., Santa Monica, Calif.
EAST AFRICAN ECONOMIC UNION: AN EVALUATION AND SOME IMPLICATIONS FOR POLICY,
by Benton F. Massell. Dec 63, 102p
Rept. no. RM-3880-RC
Unclassified report

Descriptors: (*Africa, Economics), (*Kenya, Economics), (*Tanganyika, Economics), Commerce, Transportation, Costs, Industrial production, Wages.

An East African common market, composed of Kenya, Uganda, and Tanganyika, has been in existence since 1922. In the present study, an attempt is made to (1) assess the gains and losses resulting from the operation of this common market, both from the point of view of East Africa as a whole and that of the three participant economies individually; (2) consider the gains likely to result from continuation of the common market, in either its present or an expanded form; and (3) evaluate several measures that might improve the performance of the common market and suggest a course of action the East African governments might follow. The common market has resulted in net gains to East Africa because of trade creation, factor mobility, economies of scale, and external economies. These gains have offset any losses that may have arisen as a result of trade diversion. Economies of scale have probably been of especial importance in East Africa and have undoubtedly contributed to the inflow of foreign capital and to the rise in interterritorial trade that has characterized recent East African development. A Greater East African common market -- one including, in addition to East Africa, several of the contiguous countries -- would offer only marginal short-run gains, but would possibly make a great deal of sense in the long run. (Extracted)

AD-447 882 Field 05J
CFSTI Price: HC$2.00

Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
RESPONSE AND FEEDBACK TECHNIQUES FOR AUTOMATED TRAINING OF VISUAL IDENTIFICATION SKILLS,
by Alexander Z. Weisz and Linda S. McElroy.
Jul 64, 32p
Contract N61339 789
NAVTRADEVCEN 789-3
Unclassified report

Descriptors: (*Visual perception, Identification), (*Perception (Psychology), Training), Learning, Performance (Human), Computers, Geometric forms, Effectiveness, Feedback.

A small-scale study investigated the extent to which results in favor of covert response techniques over confirmation procedures, found for paired-associate materials and identification of nonverbal sounds, apply to visual identification tasks. Three overt response procedures differing in the time at which feedback was provided, complexity of feedback, and the number of tries permitted, were compared with two prompting procedures requiring no overt response. The learning task involved discriminating among three values for each of four dimensions of variation of unfamiliar forms. Differences in performance between prompting and confirmation groups were not significant. The best procedure was one in which immediate feedback, cueing, and a simplified display of feedback information were combined. Differences between these results and previous findings in favor of prompting procedures are interpreted in terms of the nature of the tasks and the procedures employed. (Author)

HW-68600-46 Field 05B, 18J
CFSTI Prices: HC$2.00 MF$0.50

Hanford Atomic Products Operation, Richland, Wash.
PLUTONIUM ABSTRACTS. VOLUME 4, NUMBER 12.
2 Jan 65, 22p
Contract AT(45-1)-1350
Unclassified report

Descriptors: (*Plutonium, Abstracting), (*Plutonium, Bibliographies).

PB-167 306 Field 05B
CFSTI Prices: HC$2.00 MF$0.50

Little (Arthur D.) Inc., Cambridge, Mass.
AUTOMATIC MESSAGE RETRIEVAL BY ASSOCIATIVE TECHNIQUES,
by Vincent E. Giuliano. 13 Nov 62, 35p
Working memo. ACORN-17 Unclassified report

Prepared for presentation at the Congress on the Information System Sciences (1st), Hot Springs, Va., Nov 62.

Descriptors: (*Information retrieval, Automatic), Command and control systems, Subject indexing, Classification, Vocabulary, Mathematical analysis.

This paper is concerned with the problem of automatically retrieving information present in messages which are best stated in ordinary English. It is in three parts. The first part discusses existing methods and problems of automatic information retrieval, and points to requirements for a retrieval method which deals with command and control message information: a need to minimize human effort, a need for automatic word association techniques, a need to recognize a continuous scale of relevance, and a need for interaction between requestor and machine. Part II is concerned with associative retrieval techniques which although still experimental have the potential of fulfilling these needs. In Part III, a brief discussion is given of a linear method of associative retrieval under development. A preliminary view of the method indicates that it meets the requirements set down in Part I, and offers certain other advantages as well. (Author)

PB-167 307 Field 05J
CFSTI Prices: HC$1.00 MF$0.50

Hollins Coll., Va.
PSYCHOLOGICAL ORGANIZATIONS: THEIR NATURE AND MEMBERSHIP PATTERNS, Unclassified report
by Paul J. Woods. 1964, 8p
Pub. in American Psychologist v19 n8 p663-9 Aug 1964.

Descriptors: (*Psychology, Scientific organizations), (*Scientific organizations, Psychology), Scientific personnel, Projective techniques, Psychometric, Psychophysiology.

The nature and membership patterns of fourteen groups in psychology, primarily concerned with facilitating communication related to scientific information and professional problems are examined.

PB-167 310 Field 05B
CFSTI Prices: HC$1.00 MF$0.50

American Inst. of Physics, New York.
A TEST OF THE FACTOR-ANALYTICALLY DERIVED AUTOMATED CLASSIFICATION METHOD APPLIED TO DESCRIPTIONS OF WORK AND SEARCH REQUESTS OF NUCLEAR PHYSICISTS,
by Pauline Atherton and Harold Borko. Jan 65, 18p
AIP/DRP-65-1; SDC/SP-1905 Unclassified report

Joint rept. with System Development Corp., Santa Monica, Calif.
Available copy will not permit fully legible reproduction.

Descriptors: (*Factor analysis, Classification), (*Classification, Factor analysis), (*Nuclear physics, Scientific personnel), Tests, Job analysis.
Using factor-analytic procedures, an attempt was made to classify nuclear physicists into interest groups and to derive categories within nuclear physics by an analysis of search requests. The derived categories were evaluated by subject matter specialists and found to be inadequate. The test helps clarify the reasonable applications and limitations of automated classification by factor analysis. As another exercise, a nuclear physicist logically derived a classification of these 77 physicists into thirteen groups. (Author)

PB-167 316 Field 05B
CFSTI Prices: HC$1.00 MF$0.50

Association of Scientific Libraries and Information Bureaus, London (England).
THE TRIAL APPLICATION OF THE KYLE CLASSIFICATION FOR ARRANGING OF ENTRIES AND INDEXING OF THE CONTENTS OF THE FOUR ANNUAL BIBLIOGRAPHIES OF THE INTERNATIONAL COMMITTEE FOR SOCIAL SCIENCE DOCUMENTATION.
Final rept.,
by Barbara Kyle. May 64, 10p
Grant NSF G9176 Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Social sciences, Documentation), (*Classification, Subject indexing), Bibliographies, Information retrieval, Tests, Great Britain.

The purposes for which the Kyle Classification was drafted and the plans for testing it by practical application are described. The process of experimenting with KC and the results of comparing retrieval with its use and with the existing indexes of the ICSSD bibliographies are both outlined. Conclusions are drawn as to the suitability of KC for the purposes intended and advantages and disadvantages are set out. Finally, it is tentatively proposed that KC should be revised in the light of the trial applications and published; and that it should be included in the number of different indexing systems set up as illustrative models in the Aslib Research Library.

PB-167 366 Field 05B
CFSTI Prices: HC$1.00 MF$0.50

European Scientific Data Processing Center, Ispra (Italy).
A WIRING FOR NUMBER STORAGE IN THE IBM 047 TAPE TO CARD PRINTING PUNCH (Eine Schaltung zur Speicherung von Ziffern auf dem Streifen-Karten-Umwandler IBM 047),
by H. H. Bernstein. 1963, 12p
EUR 263.d; N63 15701 Unclassified report

Text in German; Attached Summary in English.

Descriptors: (*Computer storage devices, Wiring diagrams), (*Numbers, Computer storage devices), (*Punched cards, Punched tape), Relays.

Tape-to-card converters are normally not equipped with memorizing circuits. If certain information is to be punched later than it is read from the tape, a storage of this information is necessary. A solution for the storage of the numerals 1-9 is given. This solution can be generalized for the storage of all desired characters. An additional wiring for memorizing the numerals 1-7 containing 11 relays is given. The same problem is solved on the switch board of this machine by using 17 selectors.

PB-167 370 Field 05J, 12A
CFSTI Prices: HC$1.00 MF$0.50

Maryland Univ., College Park.
THE MECHANICS OF CONCEPT WORK: INFORMATION RATE.
Technical rept.,
by Murray Glanzer and William H. Clark. Nov 61, 19p
Contract DA49 007MD1004 Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Learning, Performance tests), (*Psychometrics, Learning), Reaction (Psychology), Performance (Human), Reasoning, Probability, Analysis of variance, Test methods.

Two experiments were carried out to determine the effect of information rate--the rate at which irrelevant dimensions are eliminated in a series of positive concept examples. Both experiments indicate that as information rate increases the probability of solving the concept problem decreases. This overall effect interacts significantly with the storage and selection load imposed by the problems. As either of these increases the effect of information rate increases. The statements above apply most clearly to the type of example series used in Experiment I, in which each example changes minimally from its predecessor. When a somewhat more complex and difficult type of example series is used as in Experiment II, some exceptions to the general statements appear.

PB-167 387 Field 05J, 05D
CFSTI Prices: HC$4.00 MF$0.75

RAND Corp., Santa Monica, Calif.
STALIN AND THE USES OF PSYCHOLOGY,
by Robert C. Tucker. 10 Mar 55, 106p
Rept. no. RM-1441
AD 86 720

Unclassified report

Available copy will not permit fully legible reproduction. See also AD-605 009.

Descriptors: (*Psychology, USSR), (*Conditioned reflex, Social psychology), Physiology, Political science, Biology, Personality, Behavior, Genetics.

This paper undertakes to survey the background and development of the Pavlovian revival on the basis of materials drawn from Soviet scientific discussions and theoretical journals. The author attempts to show that the new Pavlovianism, like Lysenkoism, grows out of a basic tendency of Stalinist thought to which he gives the name transformism. The political motivation behind Stalin's directive on the revival of Pavlovian studies is examined, and the actual course and stages of the revival are traced in detail. The subsiding, after Stalin's death, of the militant extreme to which Pavlovianism has been driven in 1951 and 1952 is touched upon briefly. The exposition seeks to clarify wherever possible the relationship between the theoretical trends under consideration and the practical policy goals underlying them. (Author)

PB-167 388 Field 05D
CFSTI Prices: HC$3.00 MF$0.75

RAND Corp., Santa Monica, Calif.
COLLECTIVE LEADERSHIP AND THE POLITICAL POLICE IN THE SOVIET UNION,
by Elsa Bernaut and Melville J. Ruggles.
15 Mar 56, 62p Rept. no. RM-1674
AD 96 016

Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Police, USSR), (*USSR, Political science), (*Political science, USSR), History, Communism, Communists, Government employees, Government (Foreign).

Ever since the establishment of the Soviet state in 1917, the political police has played an important role in Russian society. As time went on, the role and function of the police changed with changes in the basic policies and purposes of the Soviet state. The last important shift took place following the death of Stalin. At present, it seems that the power of the police over the Soviet population will continue, because the regime cannot do without a police system to protect itself against real or imagined enemies. But, so long as the leadership is a collective one, no Presidium member will be permitted to control the police, and no police chief will be allowed power or influence in the upper echelons of the Soviet government. (Extracted)

PB-167 389 Field 05D
CFSTI Prices: HC$3.00 MF$0.75

RAND Corp., Santa Monica, Calif.
THE POLITICS OF SOVIET DE-STALINIZATION,
by Robert C. Tucker. 14 Feb 57, 60p
Rept. no. RM-1874
AD 123 521

Unclassified report

Descriptors: (*USSR, Political science), (*Political science, USSR), History, Communism, Command and control systems, Foreign policy.

A short description is given of the Soviet political system, conceived as a 'command and control structure,' and then a conception of Stalinism as a political form, is outlined. With this conception as a base, the meaning, motives, and limits of Soviet 'de-Stalinization' are explored. From the late twenties to the late thirties, the Bolshevik party dictatorship underwent a complex process of 'Stalinization,' unfolding in two distinct phases. In the first phase, Stalin completed the totalitarianization of Russian society, extending and perfecting the basic command and control structure. In the second phase, beginning about 1934, he established his absolute autocracy as a 'superstructure of command and control,' destroying the Bolshevik party as a political organism in the process. After World War II, Stalinization was turned outward upon the world, creating the satellite empire.

PB-167 391 Field 05D
CFSTI Prices: HC$7.00 MF$1.75

RAND Corp., Santa Monica, Calif.
LEADERS OF COMMUNIST CHINA,
by Harold C. Hinton. 20 Dec 56, 314p
Rept. no. RM-1845
AD 123 522

Unclassified report

Rept. on Proj. RAND
Available copy will not permit fully legible reproduction.

Descriptors: (*China, Political science), (*Political science, China), Communism, Communists, USSR, History, Military personnel, Armed forces (Foreign), Armed forces operations.

Part I of the study deals with the structure of power in Communist China, the history of the Chinese communist movement, the general characteristics of the 238 individuals under consideration (including the types of post which they now hold), the careers and present roles of the CCP (Chinese Communist Party) top leadership (i.e., members of the Politburo, or Political Bureau, of the Seventh Central Committee of the Chinese Communist Party), and the personnel of certain leading governmental bodies. The aim is to explain the nature and

exercise of power, and the role of leadership, in Communist China. Part II deals statistically with certain selected characteristics of the 238 individuals under consideration and attempts to draw conclusions from the data presented. The aim is to show what kind of men and women these individuals are, or at least what sort of careers they have had. (Author)

PB-167 403 Field 05A
CFSTI Prices: HC$4.00 MF$1.00

RAND Corp., Santa Monica, Calif.
EFFICIENCY AND ECONOMY IN GOVERNMENT THROUGH NEW BUDGETING AND ACCOUNTING PROCEDURES,
by David Novick. 1 Feb 54, 131p
Rept. no. R-254 Unclassified report
AD 116 589

Descriptors: (*Budgets, United States Government), (*United States Government, Budgets), (*Air force budgets, United States), Costs, Weapon systems.

Contents:
Role of budgeting and accounting
Cost considerations in weapon systems analysis
RAND's cost analysis method
Description of RAND methodology
Outline of accounting system proposed for the U. S. Air Force
History of the federal budget
Coding structure for cost analysis of the U. S. Air Force

PB-167 443 Field 05J, 05H, 05K, 06D, 09B
CFSTI Prices: HC$1.00 MF$0.50

System Development Corp., Santa Monica, Calif.
COMPUTER APPLICATIONS IN THE BEHAVIORAL SCIENCES,
by John D. Ford, Jr. and Harold Borko. 20 Aug 62, 12p Rept. no. SP-927
Unclassified report

Prepared for presentation at the meeting of the American Psychological Association, St. Louis, Mo., Sep 62.
Available copy will not permit fully legible reproduction.

Descriptors: (*Psychology, Computers), (*Air traffic control terminal areas, Computers), (*Artificial intelligence, Computers), Simulation, Behavior, Memory, Pattern recognition, Social sciences.

Two recent application of computers to behavioral science research are described. The first is an on-line computer application for studying complex groups or organizations and is exemplified by the terminal air traffic control research being developed in the System Simulation Research Laboratory at System Development Corporation. Human subjects interact with this computer-simulated environment in a complex man-machine data processing and control system. The other use of computers in a behavioral science research laboratory is to have the computer simulate human behavior in a social situation. An example of this application is found in the experimental work of the Gullahorns whose computer-simulated people are able to receive, recognize, and store simuli in memory; to compare and contrast stimuli; to associate a stimulus situation with a response and response with reinforcement; and as the basis of past experience to predict the consequences of each contemplated response. These and similar computer applications provide the behavioral science researcher with the capabilities of simulating a complex external environment within which a human subject would interact, or of simulating the interaction of a human subject in social situations. (Author)

PB-167 460 Field 05C, 13H
CFSTI Prices: HC$4.00 MF$0.75

RAND Corp., Santa Monica, Calif.
INDEXES OF SOVIET INDUSTRIAL OUTPUT, VOLUME II,
by Norman M. Kaplan, Richard H. Moorsteen, and Eleanor S. Wainstein. 13 May 60, 111p
Rept. no. RM-2495
Contract AF49 638 700
AD 241 133
Unclassified report

Rept. on Proj. RAND
Available copy will not permit fully legible reproduction.

Descriptors: (*Industrial production, USSR), (*Economics, USSR), Indexes, Labor, Wages, Population, Distribution (Economics), Food, Money, Industries, Tables.

PB-167 488 Field 05D
CFSTI Prices: HC$7.85 MF$2.25

RAND Corp., Santa Monica, Calif.
ODESSA, 1941-1944: A CASE STUDY OF SOVIET TERRITORY UNDER FOREIGN RULE,
by Alexander Dallin. 14 Feb 57, 484p
Rept. no. RM-1875
AD 123 552
Unclassified report

Rept. on Proj. RAND.
Available copy will not permit fully legible reproduction.

Descriptors: (*USSR, History), Rumania, Government (Foreign), Military government, Political science, Social sciences, Sociology, Economics, Rural areas, Urban areas, Education, Culture, Religion, Newspapers.

Contents:
Odessa from peace to occupation
Transnistria ad hoc province: theory and practice
Social and economic trends
Rural areas
Urban areas
Education, culture, church, and press
Politics: attitudes, ideas, and action
Moscow's long arm
Last phase.

SB-475 Suppl. 2 Field 05B

Clearinghouse for Federal Scientific and Technical Information, Springfield, Va.
INFORMATION STORAGE AND RETRIEVAL.
Price list, selective bibliography of government research repts. and translations for Feb 63-Mar 65.
Mar 65, 31p Unclassified report

Available free from the Clearinghouse.

Descriptors: (*Information retrieval, Bibliographies), (*Bibliographies, Information retrieval), Documentation, Libraries, Subject indexing, Abstracting, Data storage systems, Automatic, Language, Punched cards, Punched tape, Typewriters, Classification.

Lists 304 domestic and foreign references on information storage and retrieval added to the CFSTI collection from February 1963 to March 1965. Reports are listed in the following categories: Information Retrieval; Information Storage Systems; Documentation; and Library Techniques. Includes research on coordinate indexing retrieval, automatic abstracting and indexing, Medlars

preliminary design, mechanized encoding and searching, citation, term, minicard and permutext indexing, data storage and retrieval systems, magnacard, punched card machines, WRU searching selector, 'Tape typewriter plan', needle-sort card system, descriptors and computer codes.

06. Biological and Medical Sciences

AD-279 671 Field 06S, 06C, 19D
CFSTI Price: HC$3.00

Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.
MORTALITY IN SMALL ANIMALS EXPOSED IN A SHOCK TUBE TO 'SHARP'-RISING OVERPRESSURES OF 3-4 MSEC DURATION.
Technical progress rept.,
by D. R. Richmond, V. C. Goldizen, V. R. Clare, D. R. Pratt, and F. Sherping. 15 Jun 61, 64p
Contract DA49 146XZ055 Unclassified report
DASA 1242

Available copy will not permit fully legible reproduction.

Descriptors: (*Shock waves, Stress (Physiology)), (*Stress (Physiology), Pressure), Shock tubes, Pathology, Nose, Mouth, Lungs, Arteries, Embolism, Thorax, Abdomen, Ear, Hemorrhage, Lethal dosage, Mice, Rats, Guinea pigs, Rabbits, Dogs, Bovines, Explosion effects.

A total of 661 animals were exposed to 'sharp' -rising overpressures of 3-4 msec duration using a shock tube of novel design which produced a pressure pulse similar to that obtained with high explosives. The reflected shock overpressures associated with 50 per cent lethality were 29.0, 38.6, 35.2 and 35.6 psi for the mouse, rat, guinea pig and rabbit, respectively. Other observations included the time of death in mortally wounded animals and gross pathological lesions likely to contribute to mortality. Selected data from the literature bearing upon the influence of overpressure and pulse duration on lethality were reviewed. These included pulse durations ranging from less than 1 msec to 6-8 sec. The critical pulse duration, that duration shorter than which the overpressures required for mortality increases sharply, was noted to depend upon animal size and to be of the order of many hundreds of microseconds to very few milliseconds for 'smaller' animals and a few to many tens of milliseconds for 'larger' animals. (Author)

AD-283 346 Field 06E, 06P, 06S.
CFSTI Price: HC$2.00

Buffalo Univ., N. Y. School of Medicine.
THE PRESENT STATUS OF RESPIRATORY RESUSCITATION.
Final rept.,
by David G. Greene. 30 Jun 62, 39p
Contracts DA49 193MD2021, DA49 007MD209
Unclassified report

Descriptors: (*Artificial respiration, Reviews), Medical equipment, Respiration, Lungs, Edema, Casualties, Drowning, Convulsive disorders, Trachea, Heart, Anesthesia, Electrotherapy, Pathology.

The work summarized deals with mechanical resuscitators, gas exchange in pulmonary edema, pulmonary mechanics in pulmonary edema, expired air resuscitation, mask-to-mask resuscitation as a practical field method of management of nerve gas casualties, resuscitation from drowning, resuscitation during convulsions, and management of the upper airway. Current information on respiratory resuscitation is reviewed with particular emphasis on the laboratory simulation of the apneic casualty, methods for evaluating resuscitation, indications forrespiratory resuscitation, the upper airway, and criteria of success. A poster outlining the most important steps in cardiac resuscitation is presented. (Author)

AD-404 871 Field 06K, 22B
CFSTI Price: HC$7.00

North American Aviation, Inc., Los Angeles, Calif.
INTEGRATION AND OPTIMIZATION OF SPACE VEHICLE ENVIRONMENTAL CONTROL SYSTEMS.
Rept. for 1 Apr 61-31 Mar 62,
by R. A. Paselk. Apr 63, 324p
Contract AF33 616 8323, Proj. 6146, Task 614609
ASD TR-61-176 P2
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Control systems, Life support), (*Spacecraft, Life support), (*Life support, Spacecraft), Synthesis, Closed ecological systems, Design, Selection, Heat transfer, Circuits, Reliability, Heat production (Biology), Quality control, Mathematical models, Heat exchangers, Absorption (Physical), Adsorption, Burning rate, Chemisorption, Matrix algebra, Equations, Numerical analysis, Optimization, Systems engineering.

Problems associated with the synthesis of optimal atmospheric control systems were explored and preliminary methods were developed and applied to an atmospheric control circuit. Supporting analytical studies were made of heat and mass transfer and chemical processes as a basis for development of Synthesis and optimization technology. Emphasis was placed on improving systems design and selection capability during vehicle preliminary design, system and sub-system design. Material and process characteristics collectively establish the basic requirements for the atmospheric control system and others simultaneously. Some of the subjects investigated are: (1) Synthesis methodology and techniques, including matrix analysis, circuit and requirement transformation. (2) Development of Optimization techniques for reduction of variables, synthesis of processes to higher assembly levels and development of decision parameters. (3) Identification of integration potentials and decision parameters, including an example.

AD-423 069 Field 06C, 05J
CFSTI Price: HC$2.00

Aeromedical Research Lab. (6571st) Holloman AFB, N. Mex.
THE CHIMPANZEE, A TOPICAL BIBLIOGRAPHY. ADDENDA,
by Frederick H. Rohles, Jr. Oct 63, 31p
ARL TDR-63-27 Unclassified report
Proj. 6893

Descriptors: (*Chimpanzees, Bibliographies), (*Primates, Bibliographies), Skeleton, Integumentary system, Nervous system, Sense organs, Spinal cord, Hematology, Cardiovascular system, Respiration, Nutrition, Metabolism, Digestive system, Reproduction (Physiology), Parasitic diseases, Behavior, Psychology.

As an addenda to the report 'The Chimpanzee, A Topical Bibliography' this report lists 158 new references on chimpanzee research. (Author)

AD-425 915 Field 06K, 06S, 22A, 22B
CFSTI Price: HC$7.00

Lockheed Missiles and Space Co., Sunnyvale, Calif.
THE BIOLOGY OF SPACE FLIGHT: AN ANNOTATED BIBLIOGRAPHY,
comp. by Charlie M. Pierce. Apr 63, 319p
Special bibliography no. SB-63-20, 8-55-63-2
Contract AF04 695 136 Unclassified report

Descriptors: (*Space biology, Bibliographies), Space medicine, Space flight, Astronautics, Astronauts, Food, Closed ecological systems, Life support, Controlled atmospheres, Wastes (Sanitary engineering), Water, Regeneration, Oxygen, Carbon dioxide, Survival, Psychology, Radiation hazards, Meteorites, Gravity, Magnetic fields, Spacecraft, Stress (Physiology), Abstracting.

The bibliography contains selected references which are concerned with biology and space flight. Topics include food provisions, atmosphere control, waste control and water recovery, emergency survival systems, psychology, radiation and meteoroids, gravitation, magnetic fields, and exobiology. The references are grouped by subject and arranged according to the first author. Indexes for corporate author, personal author, and subject are included. The general period of coverage dates from 1958 through 1962. (Author)

AD-445 282 Field 06A, 06C, 06E, 06F, 06I, 06J, 06M, 06O, 06P, 06R, 06S, 06T
CFSTI Price: HC$7.60

Walter Reed Army Inst. of Research, Washington, D. C.
MILITARY MEDICAL RESEARCH, VOLUME II.
Annual progress rept. for 1 Jul 63-30 Jun 64.
30 Jun 64, 462p Unclassified report
Available copy will not permit fully legible reproduction.
See also AD-411 948.

Descriptors: (*Medical research, Military medicine), (*Military medicine, Medical research), Biology, Microbiology, Bacteria, Viruses, Fungi, Genetics, Radiobiology, Biochemistry, Pathology, Neurology, Psychiatry, Physiology, Pharmacology, Radioactivity, Psychophysiology, Ecology, Epidemiology, Sanitary engineering, Metabolism, Immunology, Shock (Pathology), Antigens and antibodies, Antimalarials, Desoxyribonucleic acids, Antibiotics, Hormones, Behavior, Regeneration, Hemorrhage, Vision, Fatigue (Physiology), Performance (Human), Stress (Physiology), Communicable diseases, Disease vectors, Healing, Public health, Southeast Asia.

N65-19261 Field 06B
CFSTI Prices: HC$6.00 MF$1.25

Biosystems, Inc., Cambridge, Mass.
BIOLOGICAL CONTROL SYSTEMS-A CRITICAL REVIEW AND EVALUATION, DEVELOPMENTS IN MANUAL CONTROL.
by Lawrence R. Young and Lawrence Stark.
Mar 65, 225p NASA-CR-190
Contract NAS2-1372 Unclassified report
Descriptors: (*Biology, Control systems).

N65-19271 Field 06S, 06K
CFSTI Prices: HC$5.00 MF$2.75

National Aeronautics and Space Administration, Washington, D. C.
A CUMULATIVE INDEX TO THE 1964 ISSUES OF A CONTINUOUS BIBLIOGRAPHY ON AEROSPACE MEDICINE AND BIOLOGY.
Feb 65, 562p NASA-SP-7011(07)
Unclassified report

Supersedes indexes to SP-7011 and SP-7011(01)-SP-7011(06).

Descriptors: (*Space medicine, Indexes), (*Space biology, Indexes).

PB-167 097 Field 06D, 12A
CFSTI Prices: HC$2.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
RANDOM WAVELETS AND CYBERNETIC SYSTEMS, PART C,
by Enders A. Robinson. Oct 60, 48p
Technical summary rept. no. MRC-TSR-195
Contract DA11 022ORD2059
AD 251 404
Unclassified report

See also PB-167 003.

Descriptors: (*Cybernetics, Special functions (Mathematical)), (*Special functions (Mathematical), Cybernetics), Complex variables, Integral transforms, Fourier analysis, Distribution theory, Least squares method.

Contents:
All-pass systems
Admissible, L to the nth power stable gain and the minimum-delay transfer function
Wavelets and all-pass systems Rea
Realizability and unit gain property of all-pass systems
Group-delay of an all-pass system
Delay of energy by an all-pass system
Inverse to an all-pass system
The minimum-delay wavelet theorem
The canonical wavelet representation
Auto-products and cross-products of wavelets
The Karhunen theorem
Approximation theory
The Karhunen isomorphism
The theory of least squares
The minimum-delay wavelet theorem.

PB-167 100 Field 06F, 06T
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
DETERMINATION OF MINUTE INSECTICIDAL RESIDUES THROUGH BIOLOGICAL ASSAY,
by John Gurland. Sep 60, 22p
Technical summary rept. no. MRC-TSR-191
Contract DA11 022ORD2059
AD 245 951
Unclassified report

Descriptors: (*Biological assay, Insecticides), (*Insecticides, Biological assay), Toxicity, Hazards, Agriculture.

Poisonous residues on forage crops sprayed with insecticides constitute a serious health hazard. Various problems arise in attempting to estimate the amount of insecticidal residue present on treated crops. Some fortification procedures which could be used in biological

assays of extracts containing small amounts of insecticide are presented and evaluated. Although these procedures are presented in the context of quantal response assays based on housefly mortality, the possibility of their application is much wider under obvious modifications. (Author)

PB-167 269 Field 06Q
CFSTI Prices: HC$1.00 MF$0.50

Harry Diamond Labs., Washington, D. C.
DESIGN REQUIREMENTS AND PROPOSAL FOR ARMY RESPIRATORS,
by Henrik H. Straub. 22 Jun 64, 24p
Rept. no. TR-1249
Proj. MIPR R63 1MD
AD 450 049

Unclassified report

Descriptors: (*Respirators, Military requirements), (*Army equipment, Respirators), Design, Packaging, Cleaning, Weight, Storage, Operation, Pressure, Volume, Ventilation, Respiration, Control systems, Pneumatic systems, Fluids, Amplifiers.

Civilian and military respirators must, for the most part, be functionally similar. However, the environments in which military respirators must operate, impose additional and more severe requirements on their mechanical design. The functional design requirements for military-type respirators are discussed in this report. Two fluid amplifier circuits, one for a pressure-cycled and the second for a volume-cycled respirator, are described and discussed. The results of the initial in vitro tests on the first prototypes suggest that they can satisfy the predicated desin requirements. (Author)

PB-167 400 Field 06H, 06A
CFSTI Prices: HC$3.00 MF$0.75

Michigan State Univ., East Lansing.
THE SIGNIFICANCE OF FREE-FAT IN DRY WHOLE MILK AND FACTORS AFFECTING QUANTITY AND COMPOSITION OF FREE FAT.
Rept. no. 7 (final), 1 Sep 57-31 Aug 58,
by J. R. Brunner, E. F. Reinke, and T. I. Hedrick.
31 Aug 58, 60p
Contract DA19 129QM1029, Proj. 7 84 06 031
DSSC D-322; AD 232 952

Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Milk fat, Dehydrated foods), Milk, Temperature, Storage, Taste, Acceptability.

A total of 36 dry milk samples were analyzed for free-fat, self-dispersion, flavor and other properties. Nine commercial samples were collected and analyzed similarly. The samples were analyzed immediately after manufacturing and at various intervals over a period of one year following storage at 33, 70, and 90 degrees F. High initial free-fat values were found in samples processed in the following manner: (1) high temperature forewarming of fluid milk; (2) recombining of condensed skimmilk and cream; and (3) high temperature preheating of condensed milk prior to drying. Self dispersion, though not appreciably affected by the manufacturing variations, was greatest for the samples produced by recombining condensed skim with cream and drying at reduced nozzle pressures. Flavor scores were generally best for dry milk samples receiving high temperature forewarming treatments. (Author)

PB-167 409 Field 06E, 05J, 06R
CFSTI Prices: HC$7.35 MF$2.25

Walter Reed Army Inst. of Research, Washington, D. C.
MILITARY MEDICAL RESEARCH PROGRAM, VOLUME I.
Annual progress rept. for 1 Jul 63-30 Jun 64,
30 Jun 64, 434p
AD 445 277

Unclassified report

Descriptors: (*Military medicine, Army), (*Medical research, Reports), Surgery, Wounds and injuries, Blood, Metabolic diseases, Communicable diseases, Microbiology, Biochemistry, Physiology, Psychiatry, Disease vectors, Ecology, Thailand, Vietnam, Immunology, Germfree atmospheres, Radiation injuries, Pathology, Parasitology.

Contents: Combat Surgery; Military Internal Medicine; Military Psychiatry; Ionizing Radiation Injury--Prevention and Treatment; Communicable Diseases and Immunology; Army Medical Basic Research In Life Sciences; Military Preventive Medicine; Military Medical Research Program S. E. Asia; Military Medical Materiel; Biomedical.

SC-RR-64-562 Field 06J, 06R
CFSTI Prices: HC$5.00 MF$1.00

Sandia Corp., Albuquerque, N. Mex.
INDUSTRIAL HYGIENE HANDBOOK,
by R. J. Everett, L. W. Brewer, G. W. Edwards, and R. O. Mills. Feb 65, 153p
Contract AT(29-1)-789

Unclassified report

Descriptors: (*Industrial medicine, Radiation hazards), (*Health physics, Radiobiology).

07. Chemistry

AD-292 925 Field 07E
CFSTI Price: HC$1.00

Queen Mary Coll., Univ. of London (England).
PHOTOSYNTHESIS UNDER SUB-OPTIMAL CONDITIONS.
Final technical rept. no. 2, 1 Oct 61-30 Sep 62.
30 Sep 62, 14p Technical rept. no. TR-2
Contract AF61 052 245

Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Algae, Photosynthesis), (*Photosynthesis, Algae), (*Carbon dioxide, Photosynthesis), Metabolism, Sucrose, Chemical reactions, Reaction kinetics, Fructoses, Radioactive isotopes, Great Britain.

Investigations have continued on photosynthesis in Chlorella at sub-saturating levels of carbon dioxide. These investigations indicate that at low concentrations of CO2 a major portion of carbon assimilated is to be found in glycollic acid and glycine. Addition of isonicotinyl hydrazide (INH) blocks the metabolic utilization of glycine causing an accumulation of glycollate and glycine. The results indicate that under certain conditions 60% of the C incorporated may be found in these 2 products. The effect on the concentration of various intermediates present of rapidly replacing radioactive by

non-radioactive CO2 or of turning off the light supports the proposed mechanism. An additional observation is that INH increases the production of sucrose during photosynthesis at all concentrations of CO2. Evidence supporting these conclusions was presented at the International Conference on Photosynthesis in Paris in July 1962. This report is confined to further observations made subsequent to the Paris meeting. Further experiments were made to investigate the distribution of radioactivity during photosynthesis in shorter times. In this experiment the products of photosynthesis were determined at concentrations of 1.0% and 0.06% CO2. Additional data are included on sucrose formation in Chlorella and reactions involving glycine.

ANL-6951 Field 07D
CFSTI Prices: HC$2.00 MF$0.50

Argonne National Lab., Ill.
EVALUATION OF PHYSICAL PROPERTIES OF GASES AND MULTICOMPONENT GAS MIXTURES,
by John T. Holmes and Manfred G. Baerns.
Nov 64, 23p
Contract W-31-109-ENG-38

Unclassified report

Descriptors: (*Gases, Transport properties), (*Mixtures, Gases).

BMI-1713 Field 07E, 18B
CFSTI Prices: HC$0.75 MF$0.50

Battelle Memorial Inst., Columbus, Ohio.
RADIATION-INDUCED FORMATION OF ORGANOTIN COMPOUNDS,
by Allison F. Fentiman, Robert E. Wyant, Robert D. Steinmeyer, and Jack E. Kahler. 3 Feb 65, 25p
Contract W-7405-ENG-92

Unclassified report

Descriptors: (*Tin compounds, Isotope separation), (*Isotope separation, Nuclear industrial applications), (*Halides, Radiation chemistry).

IITRI-578P24-12 Field 07D, 18F, 18I
CFSTI Prices: HC$4.00 MF$1.00

IIT Research Inst., Chicago, Ill.
STUDIES OF THE RESONANCE INTEGRALS OF RE AND TM.
Final rept, 1 Mar 63-14 Mar 64,
by G. Hardie, D. A. Klopp, and W. E. Loewe. 30 Sep 64, 123p
Contract AT(11-1)-578

Unclassified report

Descriptors: (*Thulium, Nuclear magnetic resonance), (*Rhenium, Nuclear magnetic resonance), (*Nuclear magnetic resonance, Integrals).

IS-1042 Field 07D, 20B
CFSTI Prices: HC$2.00 MF$0.50

Ames Lab., Iowa.
PACK2, A FORTRAN CRYSTALLOGRAPHIC MOLECULAR PACKING PROGRAM,
by Donald E. Williams. Nov 64, 33p
Contract W-7405-ENG-82

Unclassified report

Descriptors: (*Crystal structure, Molecular properties), (*Diffraction, Crystallography).

NAA-SR-8277 Field 07E
CFSTI Prices: HC$0.50 MF$0.50

Atomics International, Canoga Park, Calif.
RADIOLYTIC AND PYROLYTIC DECOMPOSITION OF ORTHO TERPHENYL AT HIGH TEMPERATURE,
by J. M. Scarborough. 1962, 28p
Contract AT(11-1)-GEN-8

Unclassified report

Descriptors: (*Polycyclic compounds, Radiation chemistry), (*Radiation chemistry, Polycyclic compounds).

PB-166 900 Field 07D, 20H
CFSTI Prices: HC$3.00 MF$0.75

Naval Ordnance Lab., White Oak, Md.
EFFECT OF ELECTRON SHARING ON THE INTERACTION POTENTIAL FOR A COLLISION BETWEEN A PROTON AND A HYDROGEN MOLECULE,
by W. J. Glowacki. 17 Jul 64, 60p NOLTR-64-85
AD 448470; N64 31673

Unclassified report

Descriptors: (*Diatomic molecules, Scattering), (*Hydrogen, Potential theory), (*Protons, Potential theory), Electrons, Atomic orbitals, Molecular properties, Chemical bonds, Field theory, Electrostatics, Quantum mechanics, Integrals, Programming (Computers).

The potential is determined for the case in which the proton approaches along the axis of the molecule. The method of analysis is based on molecular orbitals consisting of linear combinations of atomic orbitals with the nuclear charge being treated as a variational parameter. The depth of the potential well with electron sharing is found to be about 2.4 eV for the axial collision as compared to a value of 4.1 eV obtained for the normal collision. It is also found that, as the proton approaches, the molecule begins to dilate due to a weakening of the molecular bond. A maximum dilation of 1.65 Bohr radii, which is twenty percent greater than the equilibrium separation in an undisturbed molecule, is reached at a proton-molecule separation of 2.9 Bohr radii. As the proton approaches still closer, the molecule begins to contract, reaching the symmetrical configuration which corresponds to minimum total energy at a separation of 1.51 Bohr radii between protons. This separation is about nine percent greater than that of an undisturbed H2 molecule. (Author)

PB-166 950 Field 07D, 20I, 21B, 21E
CFSTI Prices: HC$1.00 MF$0.50

Virginia Univ., Charlottesville.
NEGATIVE ION FORMATION IN THE ATOMIC OXYGEN-ACETYLENE REACTION,
by William J. Miller and A. Fontijn. Sep 64, 7p
Technical rept. no. AC-1-P
Contract Nonr362300, Proj. NR098 038
AD 448 077

Unclassified report

Rept. on Proj. SQUID.
Subcontracted to AeroChem Research Labs., Inc., Princeton, N. J.

Descriptors: (*Gas ionization, Flames), (*Oxygen, Chemical reactions), (*Aliphatic compounds, Chemical reactions), (*Flames, Gas ionization), Ionic current, Mass spectroscopy, Nitrogen compounds, Impurities, Luminescence.

Large concentrations of negative ions were observed in low-pressure atomic oxygen-acetylene reactions. The following species were tentatively identified: O(-), OH(-), C2(-), C2H(-), CN(-), O2(-), CNO(-), NO2(-), C4H(-), C3HO(-), and HCNO2(-). It is concluded that the ions are formed predominantly by electron attachment.

PB-167 268 Field 07C, 07B
CFSTI Prices: HC$3.00 MF$0.75

Naval Ordnance Lab., Corona, Calif.
BERYLLIUM RESEARCH PROGRAM.
Technical rept. no. 1, Jan-Jun 64,
by N. R. Fetter, R. H. Kratzer, K. L. Paciorek, and F. M. Peters. Aug 64, 57p
Contract Nonr4 0066, Proj. NR356 457
NAVWEPS 8204; AD 445 960

Unclassified report

Descriptors: (*Beryllium compounds, Chemical reactions), (*Metalorganic compounds, Beryllium compounds), (*Complex compounds, Beryllium compounds), Omines, Aluminum compounds, Hydrides, Organic nitrogen compounds, Borohydrides, Synthesis (Chemistry), Phosphine, Oxides, Spectra (Infrared), Diboranes, Decaboranes.

In beryllium-aluminum-nitrogen chemistry, reactions of bis-dimethylaminoberyllium with alkylaluminum hydride and aluminum hydride trimethylamine were studied. Beryllium-nitrogen chemistry covered the reactions of diethylberyllium and diisopropylberyllium with tetramethyltetrazene and the investigation of trimethylamine-diethylberyllium complexes. In beryllium-boron chemistry, the thermal behavior and the reactions of beryllium borohydride and its etherate with diborane and decaborane were investigated. Beryllium-phosphorus chemistry included the synthesis of a beryllium phenyl (methyl) phosphinate polymer, studies directed to the synthesis of fluorocarbon phosphinic acids, and the reactions of diphenylphosphine oxide with beryllium acetylacetonate and diethylberyllium.

PB-167 405 Field 07D, 20L
CFSTI Prices: HC$1.00 MF$0.50

Cornell Univ., Ithaca, N. Y.
THE EXTREME ULTRAVIOLET SPECTRA OF SOLIDS.
Final rept. for 1 Jul 52-15 Sep 55,
by D. H. Tomboulian. 15 Oct 55, 24p
Contract DA30 115ORD325, Projs. 599 01 004, TB2 0001 434
AD 84 563

Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Solids, Ultraviolet spectroscopy), (*Ultraviolet spectroscopy, Solids), Solid state physics, X rays, Valence, Beryllium, Beryllium compounds, Oxides, Silicon, Silicon compounds, Phosphorus, Sulfur, Chromium, Manganese, Nickel, Germanium, Electron transitions, Atomic energy levels, Absorption spectrum, Statistical functions.

The report summarizes the results of various investigations in the soft x-ray region. There were two main objectives in the undertaking. One was concerned with problems in solid state spectroscopy while the other objective contemplated an experimental study of the far ultraviolet radiation emitted by high energy electrons moving in circular orbits. Solid state spectroscopy in the vacuum ultraviolet has contributed a certain amount of information concerning the energy distribution of electronic states in the valence band. Such radiations are due to transitions from the populated portion of the valence band to a relatively narrow bound state. The observed spectrum yields information concerning the shape, width, wavelength positions and other features of the characteristic radiation. Depending on the character of the inner state, such information sheds light on certain aspects of the electronic level structure. Studies in absorption spectroscopy deal with electron transitions from an inner occupied level to an empty state in the valence band and lead to measurements which reflect the characteristics of the unoccupied valence levels.

PB-167 426 Field 07D
CFSTI Prices: HC$3.00 MF$0.75

Westinghouse Research Labs., Pittsburgh, Pa.
A STUDY OF THE ADSORPTION MECHANISMS ON OXYGEN ELECTRODES.
Semi-annual rept. no. 3, 1 Jun-31 Dec 63,
by Y. L. Sandler. 10 Jan 64, 58p
Contract DA36 039AMC00136E, ARPA Order 226
AD 438 942

Unclassified report

Descriptors: (*Electrodes, Oxygen), (*Oxygen, Electrodes), (*Adsorption, Oxygen), Exchange reactions, Heat of activation, Silver, Palladium, Platinum, Gold, Alloys, Surface properties, Electrolytes.

Further work on different types of isotopic exchange reactions of oxygen on silver near 200C and at 500C is presented. It is shown that the desorbing oxygen is in isotopic equilibrium. At least two types of oxygen chemisorption differing considerably in binding energy and presumably in their coordination with silver atoms contribute to the exchange, but only the weaker chemisorption is involved in the adsorption and desorption process at 200C. Some firmly bound oxygen appears to be located below the surface. The rate of desorption depends on the high temperature pretreatment with oxygen, but the activation energy does not. Hydrogen pretreatment causes a change in the activation energy of the oxygen desorption. On oxidized palladium (PdO) two types of chemisorption were found and evidence is presented for the existence of an endothermal adsorption. Initial results with platinum are also described. Preliminary experiments on the effect of different gas pretreatments on oxygen electrode characteristics were carried out in a cell operating at room temperature with 15% KOH as an electrolyte. Current-potential characteristics were studied with silver, gold, platinum and some alloys or multi-phase materials. (Author)

PB-167 475 Field 07D
CFSTI Prices: HC$3.00 MF$0.50

Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
STANDARDIZATION OF SURFACE PROPERTIES OF FINE PARTICLES.
Final rept.,
by Clyde Orr, Jr., H. G. Blocker, and Jane B. Garrett.
30 Apr 54, 52p
Contract DA36 039sc42588, Projs. 228 197, 3 99 15 022
AD 34 004

Unclassified report

Descriptors: (*Particles, Surface properties), (*Surface properties, Adsorption), (*Adsorption, Heat), Standardization, Particle size, Nickel, Charcoal, Nitrogen, Atomic energy levels, Pressure.

The surface properties of finely divided solid materials are evaluated. This particular project was concerned with heats of adsorption, i. e., the heat released at a solid's surface upon contact with a gas. Two independent methods were used in making heat of adsorption measurements. Experimental data were obtained for a nickel-silica catalyst, powdered nickel and coconut charcoal. Considerable attention was given to gas purification, to solid surface preparation and to pressure measurements in the low-pressure range. Most extensive investigation was given to the charcoal. For this material, it was found that the first molecules of nitrogen gas adsorbed gave up considerably more energy than condensation released, and that later adsorbing molecules gave up only a little more energy than is released by the process of condensation, while still later adsorbing molecules gave up approximately twice the heat of condensation until complete monolayer coverage of the solid's surface resulted. The other materials gave similar results in the range of conditions in which they were investigated. (Author)

08. Earth Sciences and Oceanography

AD-294 792 Field 08K, 18C
CFSTI Price: HC$4.00

Acoustics and Seismics Lab., Univ. of Michigan, Ann Arbor.
GNOME SEISMOGRAM ALBUM.
Special rept.,
by Tom Powell. Dec 62, 127p Rept. no. 4410-41-X
Contract SD78

Unclassified report

Special rept. by VESIAC.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismographs, Nuclear explosions), Alaska, Canada, Sweden, Finland, Northern hemisphere, Tables, Monitors, Seismological stations.

A compilation is presented of GNOME seismograms, collected from stations in the United States (including Alaska), Canada, Sweden, and Finland. The records were chosen as typical for different geographic regions of the northern hemisphere. Information about the seismograms, e.g., station and instrument data, has been included when available. Basically historical and informative, the report shows the great geographical distances at which the GNOME seismic signal was recorded. (Author)

AD-299 069 Field 08K, 09B, 12A
CFSTI Price: HC$3.00

Massachusetts Inst. of Tech., Cambridge.
MAGNETIC TAPE COPIES OF MIT GEOPHYSICS PROGRAM SET I (TIME SERIES PROGRAMS FOR THE IBM 709, 7090),
by S. M. Simpson, Jr. 30 Dec 62, 53p
Scientific rept. no. SR-4
Contract AF19 604 7378, Proj. 8652, ARPA Order 180 61, Task 865203
AFCRL 63 282

Unclassified report

Rept. on Proj. VELA-UNIFORM.
Descriptors: (*Seismology, Programming (Computers)), (*Programming (Computers), Seismology), (*Statistical analysis, Programming (Computers)), (*Geophysics, Programming (Computers)), Programming languages, Magnetic tape, Computers.

A set of over a hundred programs written for the IBM 709, 7090 related to time series computations has been assembled as 'MIT Geophysics Program Set I'. The topics involved in the program set include convolution, auto- and cross-correlation, auto- and cross-spectral analysis, sine and cosine transforms, simultaneous equations, least squares prediction and filtering, factorization of spectra, operations with polynomials, probability distributions, statistical hypothesis testing, random digits, interpolation, seismometer impulse response, miscellaneous vector operations, compact tape storage and retrieval, oscilloscope plotting, and miscellaneous utility routines. The programs are practically all subroutines or functions, compatible with FORTRAN-II calling sequences. The programs are all written in a standard format so that the symbolic decks are completely self-contained -- comment cards with each program present an abstract, description of usage, and numerical examples.

AD-427 869 Field 08K
CFSTI Price: HC$1.00

Pennsylvania State Univ., University Park. Dept. of Geology and Geophysics.
MODEL STUDIES OF SEISMIC ENERGY DISTRIBUTION AROUND DIFFERENT TYPES OF SOURCE.
Final rept.,
by B. F. Howell, Jr. and P. M. Lavin. 20 Dec 63, 10p
Contract AF19 604 7383, Proj. 8652; ARPA Order 180 61, Tasks 865208, 2
AFCRL 64-211

Unclassified report

Descriptors: (*Seismic waves, Mathematical models), Earthquakes, Faults (Geology), Models (Simulations).

Research was conducted to determine by means of model studies the effects of a few types of inhomogeneities on the pulses from different types of source. Early in the research it became apparent that better knowledge of the source mechanism of earthquakes was needed before the principal objective could be meaningfully achieved. For this reason, duplication of the source conditions approximating actual earthquakes became a second objective of the research.

AD-444 911 Field 08G, 08K, 09B
CFSTI Price: HC$3.00

Institute of Tech., Univ. of St. Louis, Mo.
SOME EFFECTS OF A LAYERED SYSTEM ON DILATATIONAL WAVES,
by Willard J. Hannon. 31 Jul 64, 74p
Technical rept. no. TR-3
Contract AF19 604 7399, Proj. 8652; ARPA Order 292, Task 865201
AFCRL 64-614

Unclassified report

Rept. on Proj. Vela-Uniform.

Descriptors: (*Structural geology, Wave transmission), (*Seismic waves, Structural geology), Earth models, Surfaces, Motion, Matrix algebra, Fourier analysis, Programming (Computers), Digital computers.

The effect of crustal model on the variation of surface motion with angle of incidence is examined by an application of the matrix formulation of N. A. Haskell. Six

crustal models, including such features as low velocity surface layers, low velocity layers at depth, and relatively thick and relatively thin total thickness are examined. Transmission coefficients are computed for frequencies ranging from .02 cps to 10.0 cps, and for angle of incidence ranging from 21 degrees to 53 degrees. The surface motion due to an incident wave of the form (1/pi)(sin 20 pi t)/t is computed. (Author)

AD-446 743 Field 08L
CFSTI Price: HC$1.00

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
PROFILE AND HEAT BALANCE AT THE BOTTOM SURFACE OF AN ICE SHEET FRINGED BY MOUNTAIN RANGES,
by J. Weertman. May 64, 12p
Research rept. no. RR-134
Task 8X99 27 001 03 Unclassified report

Descriptors: (*Glaciers, Thermodynamics), Mountains, Geophysics, Melting, Temperature, Thickness, Measurement, Erosion, Ice, Heat, Mathematical analysis.

The profile of an ice sheet surrounded by mountains is calculated and, by means of heat balance considerations, the pressure melting point conditions of the bottom ice are examined. A circular ice sheet and an ice sheet which is infinitely long in one direction are considered. The approximate profile of the whole ice sheet is obtained by adding the profiles calculated for 3 regions: an outer glacier, drainage basin on the ice sheet at the head of each outlet glacier, and from the center of the ice cap to the drainage region of each outlet glacier. The fact that the heat lost down the temperature gradient is of the same order as the geothermal heat and the heat of sliding, makes it difficult to determine whether or not the bottom of the ice sheet is at the melting point at a particular location, causing uncertainty in profile calculation. It is concluded that the profile of an ice sheet is little influenced by the presence of encircling mountains, and that the bottom temperature of immature outlet glaciers ordinarily should be at the pressure melting point, thus enabling such glaciers to erode their beds. (Author)

AD-449 434 Field 08L, 08M
CFSTI Price: HC$3.00

Army Cold Research and Engineering Lab., Hanover, N. H.
HEAT EXCHANGE AT THE GROUND SURFACE. PART II: PHYSICAL SCIENCE, SECT A: GEOPHYSICS,
by R. F. Scott. Jul 64, 76p
Cold regions science and engineering rept. II-A1
Proj. 8S66 02 001 Unclassified report
Available copy will not permit fully legible reproduction.

Descriptors: (*Permafrost, Construction), (*Heat transfer, Geology), Soils, Instrumentation, Wind, Thermal radiation, Surface temperature, Atmospheric temperature, Solar radiation, Thermal conductivity, Radiometers, Cloud cover, Polar regions, Arctic regions, Soil mechanics, Freezing, Albedo, Micrometeorology.

This monograph summarizes current knowledge about the heat exchange at the ground surface from an engineering viewpoint, aiming at the solution of the problem of predicting the ground penetration of the freezing point isotherm from weather, soil and surface conditions. (Author)

AD-449 925 Field 08L
CFSTI Price: HC$5.00

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
SNOW AND ICE ON THE EARTH'S SURFACE. PART II. PHYSICAL SCIENCE. SECT. C. THE PHYSICS AND MECHANICS OF ICE,
by Malcolm Mellor. Jul 64, 177p
Cold Regions Science and Engineering rept. no. II-C1
Proj. 8S66 02 001
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Snow, Meteorological parameters), (*Ice, Physical properties), Blowers, Ice islands, Geophysics, Surface temperature, Geodesics, Transformations.

This monograph summarizes existing knowledge of snow and ice on the earth's surface. (Author)

PB-167 258 Field 08J
CFSTI Prices: HC$5.00 MF$1.25

Woods Hole Oceanographic Institution, Mass.
OCEANOGRAPHIC OBSERVATIONS, 1961, EAST COAST OF THE UNITED STATES,
by Joseph Chase. Feb 64, 181p
Contracts 14 17 0007 9, 14 17 0007 45
FWS DR1
Unclassified report

Descriptors: (*Oceanology, Atlantic Ocean), (*Atlantic Ocean, Oceanology), Seacoast, United States, Temperature, Salinity, Oceanographic data.

Daily water temperature and salinity observations for 1961 from 18 locations along the Atlantic seaboard are tabulated, plotted, and discussed. (Author)

PB-167 262 Field 08J, 08A, 08C, 08H
CFSTI Prices: HC$3.00 MF$0.75

Bureau of Commercial Fisheries, Seattle, Wash. Biological Lab.
DISTRIBUTION OF PHYSICAL-CHEMICAL PROPERTIES AND TABULATIONS OF STATION DATA, WASHINGTON AND BRITISH COLUMBIA COASTS, MAY 1963,
by W. James Ingraham, Jr. Dec 64, 90p
FWS DR-5
Unclassified report

Descriptors: (*Oceanographic data, Seacoast), (*Washington (State), Oceanographic data), (*British Columbia, Oceanographic data), Oceanology, Temperature, Salinity, Density, Oxygen, Ocean bottom, Bathythermograph data, Depth finding, Meteorological parameters, Chemical properties, Maps, Tables, Pacific Ocean, Biology, Hydrographic surveying.

Physical-chemical oceanographic data collected off the Washington and British Columbia coasts during cruise No. 4 of the MV George B. Kelez from April 30 to May 17, 1963 are presented. Fifty-one stations were occupied within 100 miles of shore. Temperature, salinity, density, and dissolved oxygen values at varying depths to a maximum of 2,300 m. are tabulated. The following are presented: vertical sections of temperature, salinity, density, and dissolved oxygen from 0 to 2,000 and 0 to 200 m.; horizontal sections of temperature and salinity at the surface and 100 m.; temperature,

salinity, and dissolved oxygen near the bottom along the continental terrace; and charts of anomalies of dynamic heights, 0/150, 0/1,500, and 300/1,500 m., and volume transports, 0/1,500 m. (Author)

PB-167 263 Field 08H
CFSTI Prices: HC$4.00 MF$0.75

Bureau of Commercial Fisheries, Ann Arbor, Mich. Biological Lab.
LAKE MICHIGAN CHEMICAL DATA, 1954-55, 1960-61, by Alfred M. Beeton and James W. Moffett.
Dec 64, 104p
FWS DR-6
Unclassified report

Descriptors: (*Great Lakes, Chemical properties), Temperature, Meteorological parameters, Bathythermograph data, Hydrographic surveying, Fishes, Distribution, Maps, Tables.

The report presents, without interpretation, the methods and results of chemical analyses, and supplemental observations of temperatures at depth, transparency, and meteorological conditions for Lake Michigan in 1954, 1955, 1960, and 1961. (Author)

PB-167 264 Field 08J, 08A, 08C, 08H
CFSTI Prices: HC$6.00 MF$1.50

Bureau of Commercial Fisheries, Seattle, Wash. Biological Lab.
NORTH PACIFIC AND BERING SEA OCEANOGRAPHY, 1960 AND 1961,
by Betty-Ann Morse. Dec 64, 276p
FWS DR-7
Unclassified report

Descriptors: (*Oceanographic data, Pacific Ocean), (*Pacific Ocean, Oceanographic data), (*Bering Sea, Oceanographic data), Temperature, Salinity, Density, Depth finding, Bathythermograph data, Meteorological parameters, Chemical properties, Biology, Hydrographic surveying, Oceanology, Maps, Tables.

Physical and chemical oceanographic data collected in the eastern North Pacific Ocean and the Bering Sea during summer 1960 and summer 1961 are presented. One hundred fifty-one stations were occupied during 1960 and 136 during 1961. Temperature, salinity, density, and dynamic height anomaly values at varying depths are tabulated. Weather observations are also tabulated. A station summary of number and type of observations and a list of draft bottle releases are given. Most stations extended to a depth of 550 m. with some reference stations to a depth of 1,050 m. (Author)

PB-167 281 Field 08K, 17J, 18C
CFSTI Prices: HC$2.00 MF$0.0

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: PAMPAS.
Sep 63, 47p
Proj. 173 7
Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

The World-Wide Network of Standardized Seismograph Stations (WWNSS) is being established under VELA-UNIFORM Project to provide standardized instrumentation for the recording of seismic data. This program was initiated to provide improved instrumentation for recording world-wide seismic activity and to aid in the elimination of uncertainties in the analysis of seismic data due to differences in instrumentation. This report is one of a series analyzing seismic data from nuclear test explosions at the Nevada Test Site (NTS). The data used were recorded by the Standard Stations and certain supplementary stations having instruments with response characteristics similar to those of the Standard Station instruments. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods to distinguish between explosion and earthquake seismic sources. (Author)

PB-167 282 Field 08K, 17J, 18C
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: ANACOSTIA.
Apr 63, 44p
Proj. 173 7
Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises a presentation of seismic data from the ANACOSTIA event at the Nevada Test Site (NTS) as recorded by the standard stations. These data are supplemented by recordings from other Coast and Geodetic Survey stations having instrumentation similar to that of the standard stations. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of seismic methods for distinguishing between artificial explosion and earthquake sources.

PB-167 283 Field 08K, 17J, 18C
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: CASSELMAN.
Apr 63, 45p
Proj. 173 7
Unclassified report

Rept. on Proj. Vela-Uniform.
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Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises an analysis of seismic data recorded from the CASSELMAN event at the Nevada Test Site (NTS) by the standard stations. These data are supplemented by recordings at other Coast and Geodetic Survey stations having instruments similar to

those of the standard stations. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 284 Field 08K, 17J, 18C
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: BRAZOS.
Sep 63, 6p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

'Tnis shot report is issued on behalf of the Advanced Research Projects Agency, Department of Defense, to provide information which may prove of value in the study of data from nuclear tests. The data contained in this report are preliminary and subject to later revision as may be necessary. (Author)

PB-167 285 Field 08K, 17J, 18C
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: MAD.
Jul 63, 28p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises a presentation of seismic data from the MAD event at the Nevada Test Site (NTS) as recorded by the Standard Stations. These data are supplemented by recordings from other Coast and Geodetic Survey stations having instrumentation similar to that of the Standard Stations. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of seismic methods for distinguishing between explosion and earthquake seismic sources.

PB-167 286 Field 08K, 17J, 18C
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: MARSHMALLOW.
Jul 63, 41p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
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Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report is one of a series analyzing seismic data from nuclear test expolosions at the Nevada Test Site (NTS). The data used are recorded by the Standard Stations and certain supplementary stations having instruments with response characteristics similar to those of the Standard Station instruments. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods to distinguish between explosion and earthquake seismic sources.

PB-167 287 Field 08K, 17J, 18C
CFSTI Prices: HC$3.00 MF$0.75

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: YORK.
Aug 63, 61p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report is one of a series presenting seismic data from nuclear test explosions at the Nevada Test Site (NTS). The data obtained are from recordings at the Standard Stations and certain supplementary stations having instruments with response characteristics similar to those of the Standard Station instruments. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods to distinguish between explosion and earthquake seismic sources.

PB-167 288 Field 08K, 17J, 18C
CFSTI Prices: HC$3.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: BOBAC.
Sep 63, 2p
Proj. 173 7

Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises an analysis of seismic data recorded from the BOBAC event at the Nevada Test Site (NTS) by the Standard Stations. These data are supplemented by recordings at other Coast and Geodetic

Survey stations having instruments similar to those of the Standard Stations. These, and other data will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 289 Field 08K, 17J, 18C
CFSTI Prices: HC$3.00 MF$0.0

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: CODSAW.
Jul 63, 51p
Proj. 173 7 Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report is one of a series analyzing seismic data from nuclear test explosions at the Nevada Test Site (NTS). The data used are recorded by the Standard Stations and certain supplementary stations having instruments with response characteristics similar to those of the Standard Station instruments. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods to distinguish between explosion and earthquake seismic sources.

PB-167 290 Field 08K, 17J, 18C
CFSTI Prices: HC$3.00 MF$0.75

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: BANDICOOT.
Sep 63, 57p
Proj. 173 7 Unclassified report

Rept. on Proj. Vela-Uniform.
Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises an analysis of seismic data recorded from the BANDICOOT event at the Nevada Test Site (NTS) by the standard stations. These data are supplemented by recordings at other Coast and Geodetic Survey stations having instruments similar to those of the Standard Stations. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosion and earthquake seismic sources.

PB-167 331 Field 08K, 20A
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
SEISMIC BACKGROUND OBSERVATIONS AND MEASUREMENTS AT U. S. NAVAL AIR STATION, NOFOLK, VIRGINIA,
by Wendell V. Mickey. 18 Oct 60, 21p Unclassified repot

Descriptors: (*Seismology, Virginia), (*Noise, Seismology), Naval shore establishments, Landing fields, Noise analyzers, Seismographs, Acoustics, Seismic waves.

A seismic background noise study at the Naval Air Station, Norfolk, Va., indicated earth particle transient displacements from 0.0 to 4.1 microns. Recorded seismic wave frequencies of 50 to 60 cycles per second had average accelerations of about 0.01g where g is expressed in cgs units; frequencies of 10 to 17 c.p.s. were traced to an industrial noise source and had an average acceleration of 0.001g; frequencies of 2 to 10 c.p.s. had average accelerations of 0.001g and the lower frequencies had proportional lower accelerations. (Author)

PB-167 332 Field 08K, 18C
CFSTI Prices: HC$3.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
OPERATION HARDTACK II: SURFACE MOTIONS FROM UNDERGROUND EXPLOSIONS,
by D. S. Carder, L. M. Murphy, T. H. Pearce, and W. V. Mickey. 1 Apr 60, 52p Unclassified report
Contract AT29 2 746

Descriptors: (*Seismology, Underground explosions), (*Underground explosions, Seismology), Nuclear explosions, Explosion effects, Seismic waves, Recording systems, Test methods, Earth, Surface area.

Ground effects resulting from certain HARDTACK II underground explosions were measured by strong-motion and teleseismic seismographs from 2000 ft. to distances of nearly 100 miles. In addition, many temporary seismographs were operated by a number of organizations to distances of nearly 2400 miles, and routine seismographs continued to operate on a world wide basis. Some of the results are given in this report. For safety purposes, predictions of ground effects, using formulas derived by the Coast and Geodetic Survey from pre-Rainier H. E. tests and modified slightly as a result of the Rainier tests, hold with reasonable accuracy. However, it is believed that low frequency ground displacements in the distance ranges covered i this report attenuate, with absorption, as the first power of the distance. An energetic wave believed reflected from the surface near the source was recorded by some of the strong-motion seismographs. It is out of phase with the initial wave and follows it by about a quarter second. From the ground effects standpoint, the Blanca shot was equivalent to a magnitude 4.8 earthquake. (Author)

PB-167 334 Field 08E, 17G
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
GEODESY IN THE MISSILE AGE. DEVELOPMENTS SINCE WORLD WAR II.,
by Lansing G. Simmons. 23 Feb 62, 21p
Unclassified report

Presented at Houston Convention, American Society of Civil Engineers Surveying and Mapping Division, Shamrock-Hilton Hotel Houston, Tex., 19-23 Feb 62.

Descriptors: (*Geodesics, History), (*Distance-measuring equipment, Electrooptical photography), Guided missile tracking systems, Inertial guidance, Instrumentation, Ballistic cameras, Astronomical geodesics, Tracking.

Contents: Developments since World War II, Atlantic Missile Range, Rome Air Development Center, Operational launching sites, Unusual triangulation-Geodimeter survey.

PB-167 335 Field 08K, 17J, 22D
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
GROUND MOTIONS INDUCED BY SATURN SA-1 LAUNCH AT CAPE CANAVERAL, FLORIDA,
by W. V. Mickey, R. J. Brazee, and J. C. Stepp.
Jun 62, 21p
Unclassified report

Descriptors: (*Seismic waves, Launch vehicles (Aerospace)), (*Launching, Seismic waves), Acoustic properties, Florida.

Maximum earth motion induced by the SATURN SA-1 missile launch did not exceed predicted value based on an empirical scaling function developed from earlier launches up to a thrust rating of the Atlas. The prediction formula is an inverse power function of the form A = 3.02 T to the 0.75 power/D squared, where A = maximum earth particle displacement in centimeters, T = thrust rating of the vehicle in thrust pounds, D = distance from detector to source in feet. Acoustic rather than seismic propagation from the sources was observed at a distance of 5400 feet with coupling to the earth at or near the seismometer. (Author)

PB-167 336 Field 08K, 17J, 18C
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
OPERATION PRE-GNOME: SEISMIC DATA FROM NATURAL PHENOMENA AND HIGH-EXPLOSIVE TESTS NEAR CARLSBAD, NEW MEXICO,
by D. S. Carder, L. M. Murphy, W. K. Cloud, and T. H. Pearce. 12 Jan 60, 46p Unclassified report
Contract AT29 2 746

Descriptors: (*Nuclear explosions, Seismic waves), (*Underground explosions, Nuclear explosions), Seismology, New Mexico.

Formulas derived from earlier work satisfactorily predicted low frequency ground effects resulting from the Pre-Gnome explosions, but they did not predict high accelerations associated with high frequency ground waves. The Pre-Gnome experiments taken alone indicated that accelerations and ground amplitudes are proportional to the explosive charge, but physical conditions limit extrapolation on this basis to relatively low yields. Predicted accelerations resulting from a 10 kt Gnome explosion in potash mines eight or more miles away will be somewhat less than from routine blasts in the mines. The compressional wave speed in the salt stratum of the area is about 14,000 feet per second. (Author)

PB-167 337 Field 08K, 13M, 17J
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
SEISMIC BACKGROUND STUDIES AT U. S. NAVAL AIR STATION PENSACOLA, FLORIDA,
by W. V. Mickey. Jul 62, 37p
Unclassified report

Descriptors: (*Seismology, Naval air stations), (*Naval air stations, Seismology), Seismic waves, Florida, Seismographs.

A seismic background noise survey made at the Naval Air Station, Pensacola, Fla., during April 1962 indicated maximum transitory earth particle displacement of 0.00035 cm at a frequency of 13 cps. Maximum accelerations were within an order of 0.01 g with 0.0001 g representative of the proposed Gyra Test Facility in Building 709. During periods of minimum industrial activity, 742 seismic data channels were recorded in and around Building 709. A major noise source was vehicular traffic on an asphalt road near the Building. Angular deviation of the test pedestal was less than 0.28 second in any direction. The noise level was highest near the reciprocating machinery but rapidly attenuated with distance. (Author)

PB-167 338 Field 08K, 08E, 17J
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
EMERGENCY CHARTING OF THE ALASKA EARTHQUAKE DISASTER AREA,
by H. ArnoldKaro. 1964, 21p
Unclassified report

Presented to the United Nations Regional Cartographic Conference (4th), for Asia and the Far East, Manila, 21 Nov-5 Dec 64.

Descriptors: (*Earthquakes, Alaska), (*Alaska, Earthquakes), Geodesics, Seismology, Surveying, Maps, Disasters, Casualties, Rescues, Transportation, Safety, Symposia.

PB-167 339 Field 08K, 17J
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
ANALYSIS OF THE EL CENTRO ACCELEROGRAPH RECORD OF THE IMPERIAL VALLEY EARTHQUAKE OF MAY 18, 1940,
by Frank Neumann. Aug 41, 36p MSS-9
Unclassified report

Descriptors: (*Earthquakes, California), (*California, Earthquakes), Seismology, Seismic waves, Motion, Graphics.

PB-167 340 Field 08K, 17J, 18C
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
BASIC TRAVEL TIME AND AMPLITUDE DATA FROM THE GNOME EVENT,
by D. S. Carder, G. W. Gordon, and J. N. Jordan.
Aug 62, 25p
Unclassified report

Presented at Meeting of the AFOSR Advisory Committee for Geophysics (5th), on 5 Jun 62.

Descriptors: (*Nuclear explosions, Seismic waves), Seismology, Seismic waves, New Mexico, Seismological stations.

The purpose of this report is to present the basic data for the GNOME event available from a study of seismograms from permanent Coast Survey observatories and cooperating university stations. A discussion of an experiment to test the behavior of the Coast and Geodetic Survey hypocenter location program with various combinations of input data is also included in this report.

PB-167 342 Field 08K, 17J, 19D
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.

MAXIMUM ACCELERATIONS AND DISPLACEMENTS RECORDED DURING UNDERWATER DETONATION OF HIGH EXPLOSIVES IN THE LUCKY PEAK RESERVOIR, IDAHO (NOVEMBER 1962),
by B. J. Morrill. Jun 63, 20p

Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Underwater explosions, Seismology), Dams, Idaho, Detonations, Explosive materials, Seismic waves, Photographs, Maps, Graphics, Tables.

Conclusions: Underwater detonation of up to 6000 lb charges of Composition B high explosive in the Lucky Peak reservoir had less effect on the Mores Creek bridge, located 1 mile from shot point, than did heavy logging trucks crossing the bridge--maximum acceleration 0.02 g as compared with 0.05 g at the pier 4 site. However, results suggest that maximum accelerations and displacements caused by the detonations may have varied directly as the weight of explosive, but that at pier 4, the pier-superstructure coupling modified the relationship--fortunately in a favorable direction. (Author)

PB-167 343 Field 08K, 17J
CFSTI Prices: HC$4.00 MF$0.75

Coast and Geodetic Survey, Washington, D. C.
PRINCE WILLIAM SOUND, ALASKAN EARTHQUAKES MARCH-APRIL 1964.
Preliminary rept.
17 Apr 64, 103p

Unclassified report

Descriptors: (*Earthquakes, Alaska), (*Alaska, Earthquakes), Geology, Seismology, Seismic waves, Seismological stations, Photogrammetry, History, Photographs, Maps.

The report is intended to make available the early information concerning the location of the earthquake and aftershocks, the effects of the tsunami, and the observations and activities of the Coast and Geodetic Survey field operation. Supplemental information on the geology and seismic history is also provided. (Author)

PB-167 344 Field 08K, 17J
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
THE HEBGEN LAKE, MONTANA EARTHQUAKES, AUGUST 1959.
Preliminary rept.
10 Sep 59, 21p

Unclassified report

Descriptors: (*Earthquakes, Montana), (*Montana, Earthquakes), Seismology, Seismic waves, Maps, Aerial photography, Seismological stations, Data, History, Geology, Photographs.

PB-167 345 Field 08K, 17J
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
GROUND VIBRATION TESTS NEAR VALKARIA, FLORIDA.
27 Sep 60, 20p Unclassified report

Descriptors: (*Seismology, Florida), (*Soil mechanics, Florida), Seismographs, Vibration.

Ground vibration tests were made on the ground near Valkaria, Florida. The maximum ground displacement, peak to trough, from normal vibrations was about 2 microns or 0.00008 inches associated with frequencies of 2.5 to 3 cycles per second. Maximum particle velocities from normal vibrations were no greater than 0.001 inches per second and maximum accelerations no greater than 0.000025 g. From a train passing 1.3 miles away the maximum displacement, velocity, and acceleration was no greater than 0.0001 inches, 0.001 in/sec. and 0.0007 g, respectively the last two associated with a 40 c.p.s. vibration. From nearby disturbances the ground effects were much higher.

PB-167 346 Field 08K, 13M, 17J
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
SEISMIC BACKGROUND OBSERVATIONS AND MEASUREMENTS AT U. S. NAVAL AIR STATION, NORFOLK, VIRGINIA (MAY 1961),
by Wendell V. Mickey. 29 Sep 61, 39p

Unclassified report

Descriptors: (*Seismology, Naval air stations), (*Naval air stations, Seismology), Seismic waves, Noise, Florida, Seismographs.

A seismic background noise survey made at the Naval Air Station, Norfolk, Va., during May 1961 indicated maximum transient earth particle displacements of about 5.4 microns. Maximum accelerations recorded were about 0.0086 g. Frequencies of the recorded particle motions varied from less than 1 to about 30 cycles per second. Recordings were made on two concrete piers, various sites throughout Building LF18 and on the ground to the north of Building LF18. The principal noise source was three air compressors operating in the northwest corner of Building LF18. Minimal earth particle motion was recorded during off-shift periods when the industrial equipment was inoperative. Simultaneous recordings on the pier and floor indicated a guided wave phenomena which was observed on the horizontal components. The vertical components on the pier and floor were on an average lower by a factor of about five for accelerations.

PB-167 347 Field 08K, 14B, 17J
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
PERFORMANCE SPECIFICATIONS OF THE INSTRUMENTATION FOR A WORLD-WIDE NETWORK OF STANDARDIZED SEISMOGRAPHS.
4 Nov 60, 35p

Unclassified report

Descriptors: (*Seismographs, Standards), Instrumentation, Specifications, Seismological stations, Identification systems, Performance (Engineering).

Contents:
Short-time seismometer system
Long-period seismometer system
Long- and short-period recorders
Timing system
Standby system
24-Volt D.C. power supply
Record copy device
Manual
General construction specifications.

PB-167 348 Field 08K, 17J, 18C, 19D
CFSTI Prices: HC$3.00 MF$0.75

Coast and Geodetic Survey, Washington, D. C.
SEISMIC WAVES FROM AN UNDERGROUND NUCLEAR EXPLOSION UNDER A DESERT VALLEY (MISSISSIPPI EVENT),
by D. S. Carder, D. W. Gordon, and J. N. Jordan.
Jun 63, 60p

Unclassified report

Descriptors: (*Nuclear explosions, Seismic waves), (*Seismic waves, Nuclear explosions), (*Underground explosions, Nuclear explosions), Deserts, Nevada.

This paper discusses the results of a comprehensive study of basic seismic data from a large underground nuclear explosion at the Nevada Test Site (NTS). The MISSISSIPPI event was chosen for this purpose because it had the widest recording of any of the NTS explosions and is therefore the most valuable in the study of travel times and amplitudes at teleseismic distances. In addition, the seismic spectra produced by the explosion contained long-period waves of significantly greater amplitude than had been observed from the NTS heretofore. A large collapse which occurred an hour or so after the explosion and a series of intervening minor collapses are also of considerable interest.

PB-167 350 Field 08G, 08J
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
GEOLOGICAL STRUCTURE OF THE ALEUTIAN TRENCH SOUTHWEST OF KODIAK ISLAND,
by G. Peter, D. Elvers, and M. Yellin. Apr 64, 39p

Unclassified report

Descriptors: (*Marine geophysics, Alaska Gulf), (*Alaska Gulf, Ocean bottom topography), (*Ocean bottom topography, Alaska Gulf), Structural geology, Aleutian Islands; Hydrographic surveying, Magnetic fields, Gravity, Measurement, Maps.

In the Aleutian Trench area south of Kodiak Island, magnetic anomalies of more than 1200 gammas residual total intensity were found; and free-air gravity anomalies ranged as high as 150 mgals in peak to peak variations. Magnetic and gravity anomalies indicate a fissure zone in the center of the trench and the presence of the mantle at 4 km below the trench floor. Additional fracture zones are inferred on the southern flank of the trench, and the data suggest the existence of a ridge of igneous rock material underlying the northern trench slope. This northern slope also exhibits numerous linear topographic trens parallel to the trench suggesting intense faulting. It is concluded that the data support the theory that the continental margins and trenches are tensional features, and it is suggested that the theory of the expansion of the earth gives the best explanation of the observed geophysical phenomena. (Author)

PB-167 352 Field 08J
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
OCEANOGRAPHIC EXPEDITION OF THE SHIP EXPLORER,
by H. Arnold Karo. 1961, 7p

Unclassified report

Taken from International Hydrographic Review, v38 n1 Jan 1961.

Descriptors: (*Oceanographic vessels, Exploration), Geological survey, Hydrographic surveying, Ocean bottom sampling, Tides, Oceanographic data, Meteorological parameters, Marine geology.

PB-167 411 Field 08K, 17J, 18C
CFSTI Prices: HC$3.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
WORLD-WIDE STANDARD STATION SEISMIC MEASUREMENTS: TENDRAC.
Feb 63, 52p
Proj. 173 7
AD 404 012

Unclassified report

Rept. on Proj. Vela-Uniform.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Nuclear explosions), (*Seismological stations, Standardization), (*Detection, Seismology), Underground explosions, Earthquakes, Identification systems.

This report comprises an analysis of seismic data recorded from the TENDRAC event at the Nevada Test Site (NTS) by the standard stations. These data are supplemented by recordings at other Coast and Geodetic Survey stations having instruments similar to those of the standard stations. These, and other data, will be used by VELA-UNIFORM participants for studies directed toward the development of methods for distinguishing between explosive and earthquake seismic sources.

PB-167 416 Field 08M
CFSTI Prices: HC$1.00 MF$0.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
GROUND TEMPERATURE OBSERVATIONS McGRATH, ALASKA,
by G. W. Aitken. Jan 64, 20p
Technical rept. no. TR-103
AD 446 904

Unclassified report

Descriptors: (*Soils, Alaska), (*Climatology, Alaska), (*Alaska, Soils), Geophysics, Meteorological parameters, Terrain, Temperature, Polar regions, Tables, Nomographs, Resistance thermometers, Test equipment.

This report summarizes climatological, ground-temperature, and soil data obtained at McGrath, Alaska. The climatological data were obtained from U. S. Weather Bureau records for the years 1944 to 1958; the ground-temperature data were obtained from daily observations during the years 1947 to 1958; and the soil data were obtained from samples taken while drilling two holes: one in August 1946 and the other in July 1958. (Author)

PB-167 417 Field 08L
CFSTI Prices: HC$6.00 MF$1.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
BIBLIOGRAPHY ON SNOW, ICE AND PERMAFROST WITH ABSTRACTS, VOLUME XVIII,
Jun 64, 278p Rept. no. CRREL-12, vol. 18
AD 447 121

Unclassified report

Descriptors: (*Snow, Bibliographies), (*Ice, Bibliographies), (*Permafrost, Bibliographies),

(*Bibliographies, Polar regions), Arctic regions, Survival, Structures, Low temperature research, Meteorology, Climatology, Snow vehicles, Abstracting.

The Bibliography provides current and comprehensive coverage on scientific information, both basic and applied, about living and operating in the polar regions and cold areas where snow, ice and permafrost exist. Each entry includes an informative abstract, bibliographic citation, code designating the library in which the item abstracted was located (cf. p. iv) and the assigned call number. Universal Decimal Classification numbers also are assigned to each entry. (Author)

PB-167 418 Field 08L
CFSTI Prices: HC$1.00 MF$.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
DENSITY OF ICE AS A FUNCTION OF TEMPERATURE AND STRESS,
by Henri Bader. Aug 64, 9p
Special rept. no. SR-64
AD 448 069 Unclassified report

Descriptors: (*Ice, Density), Temperature, Stresses, Porosity, Glaciers, Mathematical analysis.

The equations for calculating the density of ice of moderate porosity (density greater than 0.8) as a function of temperature and stress condition are developed, and the values of parameters are calculated from the best available experimental data. (Author)

PB-167 422 Field 08K, 17J
CFSTI Prices: HC$4.00 MF$1.00

Acoustics and Seismics Lab., Univ. of Michigan, Ann Arbor.
PROCEEDINGS OF THE VESIAC CONFERENCE ON SEISMIC EVENT MAGNITUDE DETERMINATION.
May 64, 139p Rept. no. 4410-71-X
Contract SD78
AD 441 592 Unclassified report

Descriptors: (*Symposia, Seismology), (*Seismology, Symposia), Earthquakes, Seismic waves, Energy, Seismographs, Nuclear explosions, Data.

This report is a collection of papers presented at a VESIAC Special Study Conference held at the University of California April 11 and 12, 1963. The conference was called to review the seismic magnitude problem for the VELA UNIFORM program. The availability of seismic energy from high yield chemical and nuclear explosions has provided seismologists with considerable data for studying this problem. At present, magnitudes determined by Richter's method, which makes use of surface waves, are inconsistent with magnitudes determined from body waves. (Author)

PB-167 436 Field 08L, 20D
CFSTI Prices: HC$1.00 MF$0.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
FLOW OF AIR INTO A PARTIALLY-CASED SNOW TRENCH,
by Yin-Chao Yen and Don Fisher. Aug 64, 17p
Research rept. no. RR-144
Task 8X99 27 001 03
AD 449 420 Unclassified report

Descriptors: (*Snow, Permeability), (*Gas flow, Mathematical analysis), Mathematical models, Transformations (Mathematics), Linear systems, Mathematical prediction, Partial differential equations, Configuration, Ducted bodies, Fluid flow, Polar regions, Conformal mapping.

The purpose of the study is to develop an expression for the quantity of air flowing into a covered trench of rectangular cross section cut into the snow surface. (Author)

PB-167 452 Field 08L
CFSTI Prices: HC$2.00 MF$0.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
STRUCTURES IN THE UPPER SNOW LAYERS OF THE SOUTHERN DOME GREENLAND ICE SHEET,
by Thomas C. Davis, Jr. Oct 64, 33p
Research rept. no. RR-115
Proj. 8 66 02 300 Unclassified report
AD 452 460

Descriptors: (*Snow, Thermal properties), (*Atmospheric precipitation, Snow), Measurement, Greenland, Meteorological phenomena, Ice, Climatology, Physical properties, Trafficability.

Between 1 July and 7 Aug 1960, measurements of snow accumulation, temperature, density, ram hardness, and grain size were made at 7 pit studies along 191 mi of over-snow traverse. In addition of the pit studies, 38 Rammsonde profiles were measured and 166 shallow pits were dug to measure temperature in the first meter of snow. The annual accumulation of snow was found to decrease westward, from 97 cm water equivalent 50 mi from the east coast to 40 cm 80 mi from the western margin. A possible precipitation shadow and the decrease in accumulation westward indicated that the source area for the precipitation lies to the east of the southern dome in the Greenland Sea. The study was considered to be in the percolation facies located along an east to west traverse crossing at maximum dome elevation. The daily heat exchange in the first meter of snow, near the time of maximum melt conditions, was 20-35 cal/cm2. Effective values of thermal conductivity and diffusivity, as determined from the temperature curves with no attempt to isolate radiation and convection, are 4-6 x 10-3 cgs and 20-30 x 10-3, respectively. Radiation and convection in the first meter of firm cause 'effective conductivity' values to be 4 to 7 times greater than the value given by Abel's for conductivity at greater depths.

PB-167 453 Field 08L, 08J
CFSTI Prices: HC$1.00 MF$0.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
GROWTH, STRUCTURE, AND STRENGTH OF SEA ICE,
by Andrew Assur and Wilford Frank Weeks.
Oct 64, 24p Research Rept. no. RR-135
Tasks 8S66 02 001 02, DA8X99 27 001 03AD 450 186
Unclassified report

Descriptors: (*Ice, Sea water), (*Sea water, Ice), Seas, Physical properties, Mathematical analysis, Ice formation indicators, Growth, Crystal growth, Arctic regions, Cold weather tests, Phase studies.

The freezing interface determines the basic characteristics of salt ice. As the platelets composing the individual crystals of salt-ice grow, impurities such

as salt are rejected by the ice crystals and diffuse away from the platelets. The freezing point is lowered within the diffusion cloud preventing other platelets from growing in the vicinity. As a result, the plate spacing decreases with increasing growth rate. The physical constants involved are the diffusion coefficient of salt in water, and the roughness of the freezing interface. In an earlier paper the authors showed that plate spacing varied with the sixth root of depth. From this, a growth equation can be obtained for ice thickness which gives the power 3/4 in time. Past empirical equations as well as laboratory tests confirm the applicability of this power for moderately thick ice. Considering that heat transfer from the ice surface is the primary factor governing growth while the ice is thin, it is shown that the power in time is 1 for thin ice and gradually changes to 1/2 for thick ice. One may also start with the exact growth equation which considers surface heat transfer, and develop an expression for the plate spacing as a function of depth within the ice sheet. Several solutions to the problem of developing a general relation using only physical parameters are considered. The strength of sea ice is shown to depend upon past weather history. The relations allow the determination of sea-ice strength and explain observed discrepancies between properties of sea ice in various geographical areas. (Author)

PB-167 454 Field 08L, 20D
CFSTI Prices: HC$1.00 MF$0.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
ISOTHERMAL FLOW OF AIR THROUGH SNOW OF VARIABLE PERMEABILITY,
by Yin-Chao Yen, Chi Tien, and James A. Bender.
Aug 64, 21p Research rept. no. RR-143
Task 8X9 27 001 03
AD 449 422 Unclassified report

Descriptors: (*Snow, Permeability), Boundary value problems, Gas flow, Air, Differential equations, Heat transfer.

A fan was used to create a lower than atmospheric pressure at the surface of a trench wall, causing a circulation of air through the snow pack. The top of the wall was covered to make the warm air pass as deeply into the snow as possible before being drawn into the trench. Assumptions made in the formulation of the mixed boundary problem are: (1) the trench is of sufficient length so that the end effect becomes insignificant; (2) the flow is steady and isothermal; (3) D'Arcy's law is valid; (4) at a given depth, the air permeability of the snow is zero; (5) flow is symmetrical with respect to the y-axis; (6) the permeability of snow is only a function of depth. Equations are given which (1) describe the problem, (2) consider boundary conditions, air density, and snow permeability, and (3) can be solved by a numerical method, asymptotic solutions, and Rayleigh's estimate method. The problem is solved numerically to account for the effect of variable permeability. The expression for pressure distribution is given as a function of position, and the total air flow rate is obtained in terms of operating variables. An illustrative example based on actual permeability data is given to explain the procedures. (Author)

PB-167 481 Field 08L
CFSTI Prices: HC$1.00 MF$0.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
RATE OF GROWTH OR SHRINKAGE OF NONEQUILIBRIUM ICE SHEETS,
by J. Weertman. Aug 64, 21p
Research rept. no. RR-145
Task 8X99 27 001 03
AD 449 421 Unclassified report

Descriptors: (*Glaciers, Ablation), Mathematical analysis, Ice, Plasticity.

An analysis is made of the time required to build up an ice-age ice sheet and of the time required to destroy such an ice sheet. The behavior of simpler cases of ice sheets which contain only accumulation areas or only ablation areas is considered, and leads to the analysis of nonequilibrium ice sheets which contain both accumulation and ablation areas. The calculations are based on the approximation that the theory of perfect plasticity is valid. It is concluded that the time required to build up an ice-age ice sheet is longer than the time required to eliminate it. Assuming that the accumulation rate of an ice-age ice sheet is in the range of 0.2 to 0.6 m/yr, the growth time of a large ice sheet is of the order of 15,000 to 30,000 yr. Ablation rates of 1 to 2 m/yr lead to shrinkage times of the order of 2000 to 4000 yr, provided ablation occurs over an appreciable area of the ice sheets. (Author)

PB-167 482 Field 08G, 08F
CFSTI Prices: HC$2.00 MF$0.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
ILLUSTRATED SUMMARY OF THE GEOLOGY OF THE YUKON FLATS REGION, ALASKA,
by Frank P. Heinsohn, Philip L. Johnson, and Ambrose O. Poulin. Sep 64, 35p
Technical rept. no. TR-154
Task 1N025001A13002
AD 451 722 Unclassified report

Descriptors: (*Alaska, Geology), (*Geology, Alaska), Terrain, Geography, Geological survey, Aerial photography, Photographic reconnaissance, Paleontology, Photointerpretation, Permafrost, Distribution, Arctic regions.

The primary purpose of this report is to introduce the reader to the area and to provide him with a guide to the available geologic literature. It is based on a review of the literature and a field reconnaissance of the region. The major landforms of Yukon Flats are flood plains with many meanderscars and oxbow lakes, terraces, alluvial fans, and sand dunes. Permafrost is discontinuous but in the poorly drained areas, other than lakes, it occurs to a considerable depth. Glacial drift and moraines, formed during the Pleistocene glaciation of the southern Brooks Range, occur as extensive deposits in the Chandalar River drainage system. Pleistocene valley glaciation is evidenced in the higher mountains of the Hodzana Highland and the Ray Mountains by cirques, hanging valleys, U-shaped valleys, and moraine and outwash deposits. The geologic history of the area is summarized. (Author)

PB-167 483 Field 08M
CFSTI Prices: HC$2.00 MF$0.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
THE PLASTIC LIMIT AS A BINARY PACKING PHENOMENON.
Interim rept.,
by G. E. H. Ballard. Nov 64, 27p
Research rept. no. RR-152
Task 8X99 27 001 03
AD 452 459 Unclassified report

Descriptors: (*Soil mechanics, Theory), (*Plasticity, Mathematical analysis), (*Soils, Plasticity), Silt, Kaolinite, Clay minerals, Montmorillonite, Clay, Calcium, Sodium.

The plastic limit data used in this report are the result of determinations on artificial soils which had been hydrated above the plastic limit for at least 24 hr. Four theoretical zones of behavior are defined from a two-component particle packing theory to account for variations in Atterberg's plastic limit of the artificial clay-silt-water systems as the weight fraction dry clay content (X) varies from 0 to 1. From X = 0 to X = 1 the experimental plastic limit successively approaches binary packing behaviors defined by 'zones' A, B, C, and D. Three constant, K the packing constant, Ka the angularity constant, and Kg the grading constant, of zone behavior are defined to account for the experimental deviation from the theoretical behavior. For the illite- and kaolin-silt-water systems, K = Ka + Kg. In zone A the clay is pictured as filling the voids formed by the silt fraction. In zone B a gradual expansion of the silt matrix takes place with increasing clay content. Zone C is defined for that range of X in which the experimental data are independent of X and approach a given relationship. Zone D represents the higher clay content portion of the system when the silt grains do not form a continuous matrix and the experimental data approach a given binary packing relationship. (Author)

PB-167 485 Field 08L
CFSTI Prices: HC$1.00 MF$0.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
COMPARISON BETWEEN SNOW-IMBEDDED AND INDUSTRIAL BLACK SPHERULES,
by Chester C. Langway, Jr. and Ursula B. Marvin.
Oct 64, 22p Research rept. no. RR-154
Grants GA2, NsG282 63, Task 8X99 27 001 03
AD 451 668

Unclassified report

Descriptors: (*Glaciers, Impurities), (*Snow, Impurities), Greenland, Ice, Particles, Dust, Measurement, Chemical analysis, Chemical properties, Physical properties, Spheres, Electron microscopy, X-ray diffraction analysis, Arctic regions, Correlation techniques, Manganese, Nickel, Iron, Silicon.

The chemical and physical properties of black spherules collected from shallow firn and deep ice layers on the Greenland ice sheet are compared with industrial spherules (weld spatter). Morphologically both groups of spherules closely resemble each other. Electron probe microanalyses are compared with X-ray diffraction analyses on both groups of spherules. Chemically most of the Greenland spherules are Ferich with some Si and traces of Mn and rarely contain Ni. Mineralogically the Greenland black spherules are mainly magnetite (FeFe2O4) occasionally containing minor amounts of hematite (Alpha Fe2O3) with wustite (Fex-1O) found in some of the larger fragments. One black opaque spherule produced an olivine (Mg2SiO4) X-ray powder pattern. Of the five varieties of industrial spherules examined, 4 contain Ni, some up to 50%; one variety contains no Ni and is chemically similar to the Greenland spherules. Density measurements show the Greenland spherules range between 4.2 and 5.9 g/cm3 and that the industrial spherules studied range between 5.1 and 8.7 g/cm3. It is concluded that it is very difficult to establish the extraterrestrial nature of particles, at least the spherule-globule components, by morphological observations alone. (Author)

PB-167 500 Field 08J
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
PROCEDURE FOR DISSOLVED OXYGEN DETERMINATION OF SEA WATER,
by Robert B. Starr. 6 Dec 62, 21p

Unclassified report

Descriptors: (*Sea water, Oxygen), Ocean currents, Temperature, Salinity, Chemical analysis, Laboratory equipment, Processing, Oceanology.

PB-167 501 Field 08K, 14B, 17J
CFSTI Prices: HC$6.00 MF$1.25

Coast and Geodetic Survey, Washington, D. C.
THE MICROSEISMIC PROGRAM OF THE U. S. NAVY. Terminal rept.,
by Dean S. Carder and Robert A. Eppley. Apr 59, 205p
Contract NAer01793

Unclassified report

Descriptors: (*Seismology, Naval research), Microseisms, History, Instrumentation, Storms, Seismological stations, Tropical cyclones, Meteorological phenomena, Maps.

Contents: Historical review, Instrumentation and operational methods, Data, Summaries of storms, Swell, Empirical studies, Detection, Review of the Navy Microseismic Program, Conclusions and recommendations.

PB-167 510 Field 08C
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
MEASUREMENT OF TIDAL CURRENTS AT LITUYA BAY, ALASKA INTRODUCING AERIAL PHOTOGRAMMETRIC METHODS,
by Charles B. Taylor, Jr. and William D. Harris.
1965, 14p

Unclassified report

Descriptors: (*Tides, Alaska Gulf), (*Alaska Gulf, Tides), Ocean currents, Velocity, Mathematical analysis, Aerial photography, Photogrammetry, Hydrographic surveying, Bays, Maps.

PB-167 542 Field 08B
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
PROGRESS IN INTERNATIONAL CARTOGRAPHY,
by H. Arnold Karo. 1964, 31p

Unclassified report

Presented at Annual Meeting of American Congress on Surveying and Mapping (24th), Washington, D. C., 18 Mar 64.

Descriptors: (*Mapping, Reviews), Costs, Effectiveness, Maps, Scientific research.

PB-167 543 Field 08N
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
MAGNETIC RESULTS: ANTARCTIC PENINSULA TRAVERSE 1961-1962,
by P. J. Wasilewski. 1963, 15p Unclassified report

Descriptors: (*Terrestrial magnetism, Polar regions), (*Polar regions, Terrestrial magnetism), Geodesics, Measurement.

This report contains tabulations of the results of measurements of the earth's magnetic field made on the Antarctic Peninsula Traverse which was conducted during the 1961-1962 austral summer.

PB-167 546 Field 08B
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
MERCATOR PROJECTION TABLES, CLARKE SPHEROID OF 1866.
Jan 55, 22p

Unclassified report

Descriptors: (*Map projection, Tables).

Tables of meridional parts for the Mercator projection were computed from the parameters of the Clarke Spheroid of 1866: Semimajor axis = a = 6,378,206.4 meters; Flattening = (a-b)/a = f = 1/294.98. These tables can be used for special computations in which the relationship between cartographic detail on a Mercator chart and geodetic control based on the North American 1927 Datum is needed. Flattening = (a-b)/a = f = 1/294.98. The computation of the elements and the reproduction of the tables were accomplished by the U. S. Coast and Geodetic Survey with the support of the U. S. Navy Hydrographic Office. (Author)

09. Electronics and Electrical Engineering

AD-270 816 Field 09B, 12A
CFSTI Price: HC$6.00

RAND Corp., Santa Monica, Calif.
STUDIES IN THE THEORY OF COMPUTATIONAL ALGORITHMS, 1. FORMALIZATION, COMPUTABILITY, REPRESENTATION, AND ANALYSIS PROBLEMS,
by R. E. Leven. Jan 62, 270p Rept. no. RM-3007-PR
Contract AF49 638 700

Unclassified report

Rept. on Proj. RAND.
Available copy will not permit fully legible reproduction.

Descriptors: (*Programming (Computers), Theory), Programming languages, Mathematical logic, Functional analysis, Set theory, Mathematical analysis, Digital computers.

The invention and subsequent development of general-purpose digital computers and the discovery of means for their effective employment have been achieved principally through insight and empiricism, without the guidance of a generally applicable theory. Those theories of computation which have appeared have been primarily concerned with the properties of computations in infinite domains, a region in which digital computers cannot operate. Yet it seems certain that both theory and practice would benefit from a shift of the concern of theories of computation to problems arising in practice, to the properties of computations in finite domains. There are, for example, a number of important definitional problems which would benefit from the examination of the theoretician; neither 'algorithm' nor 'general-purpose computer' has a generally acceptable precise definition. Even problems of the capability and efficient representation of various classes of computational procedures, which are the practical problems which have been most carefully studied in current theories of computation, have not yet all been solved; the quest for intelligent machines and universal programming languages continues. And, of course, there remain many unsolved and important problems in the analysis and synthesis of computational procedures; effective techniques forthe analysis of arbitrary computer programs or for the synthesis of programs for the computation of arbitrary functions do not yet exist. Hence, the need for a practical theory of computation is evident. This thesis is concerned with the investigation of a number of aspects of such a theory.

AD-288 803 Field 09A, 13D, 13H
CFSTI Price: HC$3.00

Melpar, Inc., Falls Church, Va.
PLANAR INTEGRATION OF PARTS AND SOLID CIRCUITS INTO THIN-FILM UNITS.
Quarterly progress rept. no. 1, 1 May-31 Jul 62,
by H. E. Culver, L. G. Davies, J. L. Pentecost, and J. R. Sayers. 31 Jul 62, 62p
Contract DA36 039sc89109, Proj. 3A99 15 002

Unclassified report

Available copy will not permit fully legible reproduction
See also AD-293 146.

Descriptors: (*Microminiaturization (Electronics), Vapor plating), (*Circuits, Manufacturing methods), (*Electric connectors, Manufacturing methods), Vacuum apparatus, Stresses, Films, Metal films, Aluminum, Mathematical analysis, Epoxy plastics, Silicone plastics, Halocarbon plastics.

DEVELOPMENT OF COMPLIANT BRIDGING TECHNIQUES: Stress analysis of bridging material indicates that (a) the linear expansion coefficients of the substrate should be high and that of the discrete part and bridging material should be low; (b) the discrete part should be thin and the substrate recess shallow; and (c) the radius of the substrate recess should be carefully adjusted to meet certain restrictions. A literature search indicated that, of the available materials suitable for bridging between the substrate and the discrete part, silicone and epoxy, or modified epoxy material, should be investigated initially. Tests showed that one of the epoxy resins is less suitable than the others for this application. Consideration of the required misalignment of the dummy component led to the conclusion that variation in gap width can be achieved by holding component and substrate-recess diameters constant and varying the position of the component within the substrate recess. The investigation of a method of applying the bridging material to the substrate with the use of small wires has shown this to be an unsuitable method.

AD-291 105 Field 09E, 09B
CFSTI Price: HC$1.00

ITT Federal Labs., Nutley, N. J.
RESEARCH STUDY OF SYNCHRONIZATION IN DIGITAL SWITCHING SYSTEMS.
Rept. no. 1, 1 Jul-1 Oct 62.
1 Oct 62, 22p
Contract DA36 039sc90740, Proj. 3A99 12 001

Unclassified report

Descriptors: (*Synchronization (Electronics), Switching circuits), (*Switching circuits, Digital systems), Computer logic, Synchronizing switches, Atomic clocks, Radio transmission, Transmission lines.

A study was made of various methods of providing synchronization in a switching system using time division exchanges and PCM multiplex transmission between exchanges. A study of atomic and high stability crystal frequency standards was made, and it was concluded that it would be feasible to maintain exchange clock frequencies within 1 part in 10 to the ninth power. A study of long-term propagation delay variations was made, and it was concluded that these would not be significant in microwave radio transmission. Estimates were made of the delay variation in cable systems. (Author)

AD-291 649 Field 09A, 11B
CFSTI Price: HC$2.00

Clevite Corp., Cleveland, Ohio.
FERROELECTRIC CERAMIC FILTERS, IF TRANSFORMERS, AND NETWORKS.
Quarterly rept. no. 3, 1 Jun-31 Aug 62,
by D. J. Koneval and D. R. Curran. 19 Sep 62, 39p
Rept. no. 24
Contract DA36 039SC87275, Proj. 302410,
Task 3A99 15 002 05
See also AD-282 835. Unclassified report

Descriptors: (*Ceramic materials, Electric filters), (*Electric filters, Ceramic materials), (*Transformers, Intermediate frequency), Ferroelectric materials, Band-pass filters, Cavity resonators, Metal films, Electrodes, Quartz resonators, Electroplating, Photoengraving, Measurement, Processing, Radio-frequency filters, Capacitors.

Rectangular Uni-Wafer filter blanks have been fabricated with up to 13, 10 Mc dot-resonators on a 1.25 x 0.6 x 0.008 in. ceramic wafer. The rectangular shape was preferred to the thin disk shape previously used since it facilitated the interconnection of dot resonators in the ladder configuration. From prior observations of the frequency-temperature anisotropy existing between the modes of vibration of ceramic resonators, it was predicted that the thickness-shear mode should have essentially the same frequency-temperature dependence as the radial mode of vibration. This was substantiated by frequency-temperature measurements on thickness, thickness-shear, and radial resonators prepared from the same material. Methods of poling unelectroded ceramic wafers in the plane of the wafer are also discussed, as are other fabrication techniques associated with thickness-shear resonators. The two capacitor technique was used to determine the characteristics of quartz dot-resonators. Difficulties encountered and the method presently being used are discussed. Quartz Uni-Wafer ladder filters were fabricated at 10 and 20 mc using dot-resonators operating in the fundamental mode and at 30 mc utilizing the 3rd harmonic mode. (Author)

AD-420 212 Field 09B, 05A, 05D
CFSTI Price: HC$1.00

RAND Corp., Santa Monica, Calif.
INFORMATION SYSTEMS FOR CITY MANAGEMENT,
by Edward F. R. Hearle. Oct 63, 15p
Rept. no. P-2803
Unclassified report

Paper prepared for presentation at the Annual Conference, International City Managers' Association (49th), Denver, Colo., 15 Oct 63.
Available copy will not permit fully legible reproduction.

Descriptors: (*Management engineering, Urban areas), (*Data processing systems, Management engineering), (*Urban areas, Management engineering), Political science, Decision making, Information retrieval, Urban planning.

New capability to handle and analyze information invites (city) managers to think of better ways to use it in decisions. Information, of course, can only indicate; action (or inaction) remains the province of people. So managers need fear no loss of their jobs to machines and technicians. A greater fear should be that the capability of modern technology and technique, which is being applied with steady progress in business and Federal operations, will remain untapped by cities because it appears too big, too complicated or too far out. A companion danger is that managers will limit their interest in using data processing equipment to searching only for ways to reduce the cost of information handling. Far more significant benefits await the manager who exploits the equipment to supply and analyze the data on which major municipal decisions are based. (Author)

AD-427 776 Field 09B
CFSTI Price: HC$2.00

Radio Corp. of America, Bethesda, Md.
ADVANCED CHARACTER RECOGNITION TECHNIQUES STUDY.
Quarterly progress rept. no. 3, 1 Jul-30 Sep 63,
by R. B. Thomas and G. Woolley. 30 Sep 63, 45p
Contract DA36 039AMC00112E,
Task 1G023201A100 02 09
Unclassified report

See also AD-435 82.

Descriptors: (*Character recognition, Reading machines), (*Reading machines, Errors), Automatic, Corrections, Design, Effectiveness, Input-output devices, Identification, Language.

This report presents the results of a study aimed at developing techniques to enhance the output of a hypothetical character-recognition machine by producing solutions in those instances where the machine fails to identify a character within an English word in normal technical text material. The problems of selection criteria are discussed in reference to specifying the entries and context statements in a contextually-constrained grammar of syllables. An outline of the specified grammar and a sample drawn from the complete list of legal tetragrams of English are shown in the appendices. (Author)

AD-453 847 Field 09A
CFSTI Price: HC$0.50

Harry Diamond Labs., Washington, D. C.
LONG-DURATION PULSER TO SIMULATE CW OPERATION,
by George G. Emert. 20 Nov 64, 17p TM-64-13
Projs. 1P523801A300, 96300
Unclassified report

Descriptors: (*Radiofrequency pulses, Circuits), (*Electronic switches, Radiofrequency pulses), Crossed field devices, Electron beams, Electric guns, Modulators, X band, Microwave oscillators, Pulse amplifiers, Triodes, Voltage.

An electronic switch or pulser has been designed to evaluate crossed-field tubes, such as the HDL-developed 'Rotatron.' Feasibility of the pulser design has been proved in simulating CW operation of the Rotatron. The design concept is based on intermittently operating

the tube, so that the beam of the injection gun is turned on and off repeatedly by applying a voltage to the control anode. The Rotatron investigation was made at 60 pps with a duty factor of 10 per cent. Also described is a modified pulser with improved pulse shape. This pulser has performed relatively well as a modulator for plate pulsing a microwave triode oscillator at X-band at 1000 pps and a duty factor of 50%. (Author)

OTR-116 Field 09B, 13I

National Bureau of Standards, Washington, D. C.
Inst. for Applied Technology.
NUMERICAL CONTROLS.
May 65, 20p Unclassified report

Prepared in cooperation with Clyde Williams and Co., Columbus, Ohio.
Available free from the Clearinghouse.

Descriptors: (*Control systems, Machine tools), (*Machine tools, Control systems), (*Programming (Computers), Control systems), Computers, Automatic, Data processing systems, Economics, Design, Material forming, Servomechanisms.

Significant reports covering the period since 1960 were selected for this study, with reference to relevant earlier works. R and D in numerical controls (NC), which from the beginning has been heavily Government sponsored, has dwelt largely on the development of computer programming. Automatic Programming for Tools (APT), Adapting APT (ADAPT), and Computer-Aided Design are examples of computer-based approaches designed to eliminate large portions of human effort to produce complex mechanical shapes automatically, accurately, and economically. Applied research has developed adaptive control, a method of controlling cutting tool motion and wear by monitoring and altering cutting parameters automatically. Retrofitting old, nearly-useless milling machines to accommodate NC has been proved feasible, though time-consuming and costly. Evaluation of NC fabricated forging dies has shown that NC is capable of producing quality work, superior both in accuracy and in surface finish. However, in producing forging dies, unless the NC tool can produce more than one die from each tape, it will be no more economical than non-NC tools. Now, too, by defining a ship's hull mathematically and applying it to the memory of the computer, NC can be gainfully used in shipyard fabrication techniques, such as flame-cutting and stretch forming. (Author)

OTR-117 Field 09A

National Bureau of Standards, Washington, D. C.
Inst. for Applied Technology.
DIELECTRIC FILMS IN MICROELECTRONICS.
Jun 65, 20p Unclassified report

Prepared in cooperation with Westinghouse Electric Corp., Baltimore, Md.
Available free from the Clearinghouse.

Descriptors: (*Dielectric films, Microminiaturization (Electronics)), (*Microminiaturization (Electronics), Dielectric films), Reviews, Abstracting, Bibliographies, Dielectrics, Dielectric properties, Circuits, Capacitors, Semiconductors, Oxides, Halides, Performance (Engineering), Polymers.

Significant reports covering the period since 1961 were selected for this study, with reference to relevant earlier works. The rapid evolution of thin film devices over the past few years has resulted in large part from Government-sponsored research programs in connection with: (1) investigations of suitable materials for use as dielectric, (2) analyses of the parameters involved in attempting to obtain a reproducible process, (3) refinement or development of dielectric fabrication techniques, (4) substantial testing of the selected dielectric material in investigations of long time stability of the electrical characteristics, (5) improvements of existing thin film dielectrics, and (6) fabrication of circuits utilizing selected thin film capacitors. Use has been made of inorganic materials such as the oxides and halides of metals and semiconductors. Some research has been carried out in the development of organic polymers for thin film dielectrics; however, a principal drawback is the requirement for operating in high temperatures over prolonged periods. Advances in the fabrication processes have been made to meet the exacting requirements such as for the independent and simultaneous control of the manufacturing parameters.

Patent 3,177,322 Field 09A, 19A

INSTANTANEOUS ELECTRO-CHEMICAL SWITCH.
Patent assigned to Army,
by Donald N. Shaw. 6 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Electrochemistry, Electric switches), (*Electric switches, Rocket igniters), Explosive materials, Ignition, Patents.

The switch is designed for use in initiating circuits of rockets. The structure includes a closed container with four or more electrical contacts. Two of the contacts are connected with an explosive which, when fired, produces a conductive gas which permits flow of current through the other two contacts.

Patent 3,177,373 Field 09A

TRANSISTORIZED LOADING CIRCUIT.
Patent assigned to AEC,
by Richard H. Graham. 6 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Switching circuits, Transistors), (*Relaxation oscillators, Transistors), Design, Patents.

The output voltage of a conventional transistorized Eccles-Jordan bistable multivibrator is amplified by the circuit arrangement. A transistor switch of virtually zero impedance is inserted into the MV emitter leg with this switch performing the high voltage switching operation.

Patent 3,177,408 Field 09A

SUPERCONDUCTOR SOLENOID WITH OVERHEAT PROTECTIVE STRUCTURE AND CIRCUITRY.
Patent assigned to AEC,
by Robert G. Mills and Kenneth E. Wakefield.
6 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Superconductors, Solenoids), (*Solenoids, Superconductors), Magnetic fields, Cryogenics, Electromagnets, Temperature control, Energy, Absorption, Patents.

A superconductor is capable of producing a high solenoidal magnetic field. The solenoid is employed in a stellerator. Energy is removed from the field by use of a normal resistance coil in electrical parallel with the superconductor and closely linked to the field with a larger mass than the superconductor so as to absorb energy from the field in the form of losses in the coil.

Patent 3,177,421 Field 09A

RECTIFIED ALTERNATING-CURRENT CONVERTER.
Patent assigned to Commerce,
by George Franklin Montgomery. 6 Apr 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Half-wave rectifiers, Coils), Voltage amplifiers, Filters (Electromagnetic), Circuits, Alternating current, Patents.

A half-wave rectifier circuit is shown in which the rectified output of an A.C. source is applied to a filter circuit, that includes an inductor, in such a manner that current flows through the inductor during each half-cycle of the alternating voltage. Current flow through the rectifier, that supplies current to the inductor, is permitted during one half-cycle and is blocked during the other half-cycle of the alternating voltage. In the voltage-multiplying rectifier circuits, the inductor is provided with two windings and two rectifiers. Each rectifier permits rectified current from the source to flow through a respective one of the windings during alternate half-cycles of the alternating voltage.

PB-167 314 Field 09A, 12A
CFSTI Prices: HC$1.00 MF$0.50

New York Univ., N. Y. School of Engineering and Science.
SYNTHESIS OF A NONLINEAR SUMMATION THRESHOLD DEVICE,
by Philip Kaszerman. Jul 62, 24p
Technical rept. no. TR-400-64
Grant AF AFOSR62 152
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Networks, Mathematical models), (*Special functions (Mathematical), Networks), Switching circuits, Computer logic, Mathematical logic, Decision theory.

A model and a method of synthesis are presented for a network, called a nonlinear summation threshold device, which realizes Boolean functions whose true vertices are separable from the false by surfaces other than hyperplanes. The network consists of AND circuits and a single linear threshold device. It is assumed that the algebraic values of the inputs and the output of an AND circuit may be taken to be zero or one. Under this assumption, it is shown that the AND circuit is equivalent to a device which performs exponentiations, multiplications, and summation. It is shown that a network consisting of a properly chosen group of AND circuits whose outputs are the input to a linear summation threshold device performs in the same manner as a threshold circuit in which the summation is not linear. A procedure is given for choosing the AND circuits and the parameters of the threshold device so as to realize a given Boolean function. Any Boolean function may be implemented by this network. (Author)

PB-167 318 Field 09D, 09B
CFSTI Prices: HC$1.00 MF$0.50

Melpar, Inc., Watertown, Mass.
RECOGNITION OF MEMBERSHIP IN CLASSES,
by George S. Sebestyen. 17 Aug 60, 7p
Contract AF30 602 2112
Unclassified report

Pub. in IRE Transactions of the Professional Group on Information Theory vIT-7 n1 p44-50 Jan 1961.

Descriptors: (*Pattern recognition, Decision theory), (*Decision theory, Pattern recognition), (*Speech recognition, Decision theory), Statistical processes, Transformations (Mathematics), Numerals, Automatic, Theory, Character recognition, Vector analysis.

This paper presents an approach to the general problem of recognition of membership in classes which are known only from a set of their examples. A geometrical approach is taken where membership in classes is regarded measurable by metrics (methods for measuring distance) with which a set of points, representing different members of the same class, may be brought 'close' to one another. For the case where classes are Gaussian processes, the method described herein and that of decision theory are found to agree. A practical application of the method to the automatically 'learned' recognition of spoken numerals is described. (Author)

PB-167 323 Field 09A
CFSTI Prices: HC$2.00 MF$0.50

Bell Telephone Labs., Inc., Murray Hill, N. J.
ENGINEERING SERVICES ON TRANSISTORS.
Quarterly progress rept. no. 5, 1 Apr-30 Jun 64,
by J. Kocsis, B. T. Murphy, and R. L. Pritchett.
30 Sep 64, 43p Rept. no. R-17
Contract DA36 039AMC02227E, Proj. 1G6 22001A056
AD 451 133
Unclassified report

Continuation of Contract DA36 039sc90759.

Descriptors: (*Transistors, Germanium), (*Integrated circuits, Costs), Design, Manufacturing methods, Encapsulation, Gain, Electrical properties, Ultrahigh frequency, Gates (Circuits), Computer logic, Packaging, Microwave frequency, Superhigh frequency.

Planar germanium transistors were fabricated and encapsulations were made in two header types. Microwave measurements are presented on a transistor of structural design No. 2. DC beta's of 40 to 50 and rf power gains of 10 to 15 db at 2 Gc were obtained. A few transistors with micron spacings (structural design No. 3) were encapsulated. A brief review of this work is also presented. A generalized cost-size relationship was derived for a monolithic circuit consisting of N identical components, taking into account variations in component density, yield, and assembly costs with N. The discussion, intended to reveal cost trends rather than give accurate results for specific cases, deals only with fabrication costs. It was found that the ratio of circuit cost per component to cost of discrete transistor is minimum at a chip size which was determined primarily by the spot-defect density on the device.

PB-167 365 Field 09C, 09B, 20F
CFSTI Prices: HC$2.00 MF$0.50

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
LINEAR DISCRIMINATION OPTICAL-ELECTRONIC IMPLEMENTATION TECHNIQUES (CONTAC),
by T. R. Babcock, R. C. Friend, and P. Heggs.
22 Oct 62, 50p Preliminary rept. no. CAL-122
Unclassified report

Descriptors: (*Discriminators, Optical instruments), Feasibility studies, Model tests, Character recognition, Pattern recognition, Reading machines.

Optical-electronic techniques for implementation of linear discrimination systems indicate considerable promise for high-speed parallel pattern recognition problems. Several multiple image optical schemes have been conceived and investigated using lens and mirrors to solve the sensor to association unit interconnection problem. The A-unit activity pattern may be transmitted by multiple image lenses through weights to the response units. Fixed density A to R weights may be satisfactorily formed by the Kodak Autoscreen process. Experimental investigation of the optical and electronic techniques for the linear discriminator has resulted in the development of a single-element experimental model which has satisfactorily demonstrated the ability to dichotomize typewritten letters. Preliminary results indicate that a full scale linear discriminator model would, from the implementation considerations, be technically feasible.

PB-167 379 Field 09A
CFSTI Prices: HC$4.00 MF$1.00

Boeing Co., Seattle, Wash.
MANUAL FOR CIRCUIT ANALYSIS AND DESIGN, TREE, VOLUME I.
Rept. for Jun 63-Jun 64.
Jul 64, 139p
Contract AF29 601 6014, Proj. 5776, Task 577602
WL TDR-64-60 V1;AD 447 151
Unclassified report

Continuation of Contracts AF33 616 7531, AF33 616 7804, and AF29 601 5238.

Descriptors: (*Circuits, Instruction manuals), (*Instruction manuals, Circuits), (*Radiation damage, Circuits), Electronic equipment, Mathematical prediction.

A manual describing methods for predicting the detailed responses of electronic circuits and systems to a nuclear radiation pulse is presented in two volumes. Volume 1 outlines the procedures necessary for making both rapid estimates and detailed predictions of a circuit's response; examples are given for each method and results, including experimental comparisons, are shown for twenty circuits and systems. Logic, linear, and nonlinear circuits are included. Computer techniques are presented which contribute to a more rapid solution of the equations necessary for solving the charge-control radiation equivalent circuit behavior. The philosophy of circuit and system hardening is discussed and specific suggestions are given for improving component selection and circuit design. Procedures for correlating results of measurements and predictions in different nuclear radiation environments are discussed and dosimetry techniques are presented for X-ray, gamma ray, electron, and neutron sources.

PB-167 384 Field 09B
CFSTI Prices: HC$4.00 MF$1.00

Air Force Weapons Lab., Kirtland AFB, N. Mex.
SLIP PRELIMINARY INSTRUCTIONAL MANUAL,
by George W. Atkinson. Aug 64, 127p
WL TDR-64-98
AD 447 491
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Programming (Computers), Instruction manuals), (*Programming languages, Programming (Computers)), Data storage systems, Data processing systems.

SLIP is a collection of a hundred subroutines which enables the programmer to use list processing techniques within a FORTRAN system, in this case FORTRAN 63. SLIP is an acronym for Symmetric List Processor. In this system, each list cell contains both a link to the preceding cell and a link to the succeeding cell. This preliminary instruction manual is intended as a guide to the programmer to enable him to use the SLIP system as modified for FORTRAN 63. Each subroutine is presented along with an explanation of its use. Relevant explanations of the SLIP system are added as the various subroutines are encountered. The SLIP system is now operational on Kirtland's 1604 computer and the subroutines have been added to the FORTRAN 63 library tape. (Author)

PB-167 410 Field 09B
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
COMPUTERS AND INFORMATION FLOW,
by R. L. Patrick. Oct 63, 22p
Rept. no. P-2791
AD 421 140
Unclassified report

Descriptors: (*Computers, Analysis), (*Data processing systems, Standards), Analog computers, Digital computers, Special purpose computers, Programming (Computers), Programmers, Costs, Input-output devices, Real time.

Contents:
General-purpose digital computer; special-purpose computer; analog computer
Digital computer as a tool; accuracy and significance; input, compute, and output; stored programming; auxiliary storage (tapes, drums, discs); hardware and software; computer program
Rental agreements; total cost; large budget item
Programmers; programming field
Advantages of computer processing; scientific application; business application
Batch process; on-line process; real-time process; process control; command and control
Five symptoms accompanying latent computer application (volume operation, complex job, payoff function, large file, sterile handling)

PB-167 423 Field 09A, 18D
CFSTI Prices: HC$3.00 MF$0.75

Hughes Aircraft Co., Fullerton, Calif.
DEVELOPMENT OF RADIATION HARDENED READOUT CIRCUITS.
Semi-annual technical summary rept.,
by R. L. Russell. 1963, 54p Rept. no. FR-6410-105
Contract AF29 601 6282, Proj. 8812, ARPA Order 307 62
AD 440 178
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Circuits, Measuring devices (Electrical and Electronic)), (*Radiation damage, Circuits), Computer logic, Tunnel diodes, Switching circuits, Sensitivity, Calibration, Environmental tests, Diodes (Semiconductor), Silicon, Germanium, Gamma rays, Transistors, Electromagnetic pulses, Pulse counters, Pulse analyzers, Nuclear explosions.

The FOREST (Fast Order Radiation Effects Sampling Technique) circuit program was initiated for the purpose of developing a system of radiation hardened sampling circuits. The system is to be capable of measuring pulse characteristics such as amplitude, width, and rise time while being subjected to intense nuclear radiation, similar to that presented by a nuclear weapon detonation. Therefore, FOREST circuitry can be employed as low cost instrumentation for experiments concerned with radiation effects studies. A FOREST circuit utilizing the radiation resistant qualities of tunnel diodes has shown promise in measuring pulse characteristics such as those encountered in radiation effects experiments. This circuit employs a tunnel diode in a bistable configuration such that an irreversible readout device can detect the change of state of the bistable circuit caused by an input pulse possessing the correct amplitude and width. Experiments have been conducted to evaluate FOREST circuit performance in high level nuclear radiation fields. (Author)

PB-167 424 Field 09A, 11H
CFSTI Prices: HC$3.00 MF$0.75

Stanford Research Inst., Menlo Park, Calif.
STABLE SLIDING CONNECTOR CONTACTS.
Final rept. for 1 Dec 61-30 Sep 63,
by Jack R. Anderson and John B. Saunders.
30 Sep 63, 64p
Contract DA36 039SC89150, Proj. 3915,
Task 3A99 15 002
AD 426 113
Unclassified report

Original document contains color other than black and white and is available in limited supply. After present stock is exhausted, it will be available in black and white only.

Descriptors: (*Sliding contacts, Electric connectors), (*Electric connectors, Sliding contacts), Lubricants, Test equipment, Amines, Salts, Monomolecular films, Environmental tests, Friction, Gold, Metal coatings.

Monolayers films of octadecylamine hydrochloride offer an effective approach to reduce friction and wear when applied to gold, gold-plated copper bars, or gold-plated connector pin substrates; contact resistance was like metal-metal contact. The spring loading forces for ten half-sectioned pin and socket connectors varied between 440 and 780 grams; for the quarter-sectioned connector, between 210 and 500 grams. With these pin and sockets with known loading forces, the unlubricated coefficient of friction was 0.7-1.0 and the lubricated (monolayer film of octadecylamine hydrochloride) coefficient of friction was about 0.2. Measurements of friction and contact resistance for coated, gold-plated copper bars at several temperatures up to 100 degrees C and after extraction in water at 100 degrees C for 20 days, resulted in no significant decrease in octadecylamine hydrochloride lubricant durability. The lubricant properties and contact resistance of an octadecylamine hydrochloride film applied to gold-plated copper bar and connector pin substrates were, in general, unaffected by exposure to naturally occuring industrial, smog, and salt spray atmospheres. (Author)

PB-167 425 Field 09A
CFSTI Prices: HC$3.00 MF$0.75

Motorola, Inc., Phoenix Ariz. Semiconductor Products Div.
NON-VACUUM DEPOSITION TECHNIQUES FOR USE IN FABRICATING THIN FILM CIRCUITS.
Interim engineering rept. no. 1, 1 Jul-30 Sep 64.
15 Oct 64, 5p
Contract NObsr91336, Proj. SR0080303, Task 9631
AD 450 131
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Circuits, Manufacturing methods), (*Dielectric films, Vapor plating), (*Vapor plating, Dielectric films), Dielectrics, Resistors, Encapsulation, Impurities, Resistance (Electrical), Electrical properties, Pyrolysis, Industrial equipment, Tin compounds, Aluminum compounds, Silicon compounds, Tantalum compounds, Boron compounds, Oxides, Metalorganic compounds, Ceramic materials.

Methods for the vapo phase deposition of a variety of metal oxide based dielectrics were developed. A general purpose apparatus for the deposition of these materials was developed.

PB-167 434 Field 09D, 17I
CFSTI Prices: HC$3.00 MF$0.75

Michigan Univ., Ann Arbor.
THE THEORY OF SIGNAL DETECTABILITY.
PART II: APPLICATIONS WITH GAUSSIAN NOISE,
by W. W. Peterson and T. G. Birdsall. Jul 53, 97p
Technical rept. no. TR-13
Contract DA36 039sc15358, Projs. M970, 3 99 04 042,
Task EDG3
AD 16 787
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Signals, Detection), Signal-to-noise ratio, Statistical analysis, Probability, Theory, Demodulation.

The full power of the theory of signal detectability can be applied to detection in Gaussian noise, and several general results are given. Six special cases are considered, and the expressions for likelihood ratio are derived. The resulting optimum receivers are evaluated by the distribution functions of the likelihood ratio. In two of the special cases studied, the uncertainty of the signal ensemble can be varied, throwing some light on the effect of uncertainty on probability of detection. (Author)

PB-167 457 Field 09B, 09A, 16A
CFSTI Prices: HC$3.00 MF$0.75

Institute for Cooperative Research, Univ. of Pennsylvania, Philadelphia.
STUDY OF PIECE PART FAULT ISOLATION BY COMPUTER LOGIC. VOLUME II. TECHNICAL DESCRIPTION, FATAL II COMPILER-ASSEMBLER SYSTEM.
Final rept. for 1 Jul 62-30 Jun 64,
by C. Beckman, J. Adler, S. D. Bedrosian, R. S. Berkowitz, and T. C. Chen. 30 Jun 64, 93p
Contracts DA36 034ORD3347RD, DA36 034ORD3347A
AD 444 558
Unclassified report

See also AD-603 135, AD-603 136, AD-605 224, and AD-615 337.

Descriptors: (*Networks, Analysis), (*Guided missiles, Checkout equipment), (*Checkout equipment, Guided missiles), (*Reliability (Electronics), Computer logic), (*Circuits, Test methods), Programming (Computers), Digital computers, Compilers, Programming languages.

Contents (description of processors and subprograms for compilation of statement types):
Chapter I, The executive routine
The major parse routine
The executive routine handling of declarators
The handling of left and right grammatical parenthesis
Chapter II. The arithmetic processor
Program SWCHER
Program OPSTAK
Program SYMLST
Chapter III. The handling of procedures
The return declarator
The close declarator
Procedure calls.

PB-167 466 Field 09A, 09E
CFSTI Prices: HC$0.75 MF$0.50

Harry Diamond Labs., Washington, D. C.
DIRECT-COUPLED MICROPOWER TRANSISTORIZED PREAMPLIFIER,
by B. P. Zanin. 18 Aug 64, 20p
Rept. no. TM-64-2
Projs. 1C542703D341, 42000
AD 452 441
Unclassified report

Descriptors: (*Preamplifiers, Transistors), Feedback amplifiers, Transistor amplifiers, Feasibility studies.

A micropower four-stage, direct-coupled, low-frequency preamplifier has been designed and tested for high-stability operation over a -40 to +60C temperature range. The unit employs unique a-c and d-c feedback circuitry and diodes to provide interstage coupling. Test results obtained with five of these units indicate the feasibility of the design concept. A description is included of the circuitry, theoretical design procedures, and performance data obtained with the micropower preamplifier. (Author)

10. Energy Conversion (Non-propulsive)

AD-266 390 Field 10A, 09A, 20I
CFSTI Price: HC$2.00

Purdue Univ., Lafayette, Ind. School of Electrical Engineering.
MICROWAVE ENERGY CONVERSION.
Rept. for Jul 60-Jan 61,
by E. M. Sabbagh. Apr 61, 49p
Contract AF33 616 7355, Proj. 3145, Task 61098
WADD TR-61-48 P1
Unclassified report

Descriptors: (*Energy conversion, Microwave frequency), (*Microwave frequency, Energy conversion), Plasma medium, Diodes (Semiconductor), Rectifiers, Electron accelerators, Klystrons, Magnetrons, Diodes (Electron tubes).

Contents:
Plasma diode
Direct rectification of microwave energy using semiconductor diodes
Conversion by acceleration of electron beams
Klystron converter project
Inverted magnetrons
Vacuum diode.

AD-443 597 Field 10A
CFSTI Price: HC$1.00

AVCO Everett Research Lab., Everett, Mass.
DETAILED PERFORMANCE EVALUATION OF THE MARK V SELF-EXCITED MHD GENERATOR ENGINEERING SERVICES FOR INVESTIGATION OF THE EFFECTS OF VARIATION OF MASS FLOW, LOADING, SEED CONCENTRATION, AND MAGNETIC FIELD STRENGTH ON THE PERFORMANCE OF THE MARK V 20-MEGAWATT GENERATOR.
Quarterly technical summary rept.
Jul 64, 17p
Contract AF33 615 1862, Proj. 6329; ARPA Order 291
Unclassified report

Descriptors: (*Generators, Magnetohydrodynamics), (*Magnetohydrodynamics, Generators), Performance (Engineering), Fluid flow, Magnetic fields, Power, Tests, Voltage, Electrodes, Pressure.

The goals of this program are to investigate the effects of variation of mass flow, loading, seed concentration and magnetic field strength on the performance of the Mark V, 20-megawatt, self-excited MHD generator which will lead to a close definition of these effects on generator performance, along with a thorough evaluation of its characteristics during transient and steady state operating conditions. Efforts were devoted to obtaining an understanding of the self-excitation characteristics of the generator and to increasing the performance towards the rated power level. Included in the report is the time phase series of tests which have been conducted, the problems which have been encountered, and a discussion as to the steps taken in the solution of these problems. The chief problem to be encountered has been that of voltage breakdown between electrodes. Included for each test are the mass flows, seed rates, loading configurations, and curves of the self-excitation-time characteristics for those tests which are of the most interest.

Patent 3,175,105 Field 10A

CONVERSION OF HEAT TO ELECTRICITY.
Patent assigned to Army,
by John E. Creedon, Sol Schneider, and Mortimer H. Zinn. 23 Mar 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Thermionic converters, Electric discharges), (*Thermoelectricity, Thermionic converters), (*Electric power production, Thermionic converters), Energy conversion, Power supplies, Spacecraft, Portable, Ground support equipment, Patents.

Heat is converted to electricity by electric discharge devices of the thermionic converter type. The two stage thermionic converter is used as a power supply for satellites and portable field equipment. It combines two diverse discharge chambers in a manner which results in a high output power and high Carnot efficiency.

PB-167 327 Field 10C
CFSTI Prices: HC$2.00 MF$0.50

Lockheed Missiles and Space Co., Palo Alto, Calif.
LITHIUM-SILVER CHLORIDE SECONDARY BATTERY INVESTIGATION,
Quarterly technical progress rept. no. 2,
by J. E. Chilton, Jr., W. J. Conner, and R. W. Holsinger.
14 Jul 64, 27p
Contract AF33 615 1195, Proj. 8173, Task 817304 10
AD 450 428; N64 33979
Unclassified report

Available copy will not permit fully legible reproduction.
See also AD-607 968 and AD-612 189.

Descriptors: (*Storage batteries, Design), (*Silver compounds, Chlorides), (*Lithium, Batteries and components), Electrodes, Electrolytic cells, Electrolytes, Seals (Stoppers), Hermetic seals, Electrodeposition, Aerospace craft, Organic solvents, Packaging, Battery separators, Silver compounds, Aluminum compounds, Lithium compounds, Chlorides, Carbonates, Aluminum, Alkenes.

Aluminum cases for housing the Li - AgCl-nonaqueous electrolyte cell system were prepared using an improved seal assembly technique. No leaks greater than 10 to the - 9th power CC/sec were found. Propylene carbonate electrolyte conductivity may be increased by the addition of solvents such as ether and toluene. The electrodeposition of propylene lithium from 50 vol-% solutions of these solvents with propylene carbonate LiCl and AlCl3 occurs at high efficiency. Li electrodeposition occurs with high efficiencies from propylene carbonate solutions with LiClO4, bromide or chloroaluminate salts. AgCl electrodes are prepared by pasting a mix of 75% AgCl, 10% Ag flake, 10% graphite and 5% acetylene black by weight. At current densities less than 0.5 ma/sq cm and mix weight of 0.08 gm per cm2 sq cm (both sides) the utilization of AgCl approaches 100%. Total chloride ion content of the propylene carbonate electrolyte was determined by nonaqueous potentiometric titration with AgClO4. The solubility product for AgCl in propylene carbonate solutions indicated that AgCl solubility is less in propylene carbonate than in water.

11. Materials

AD-277 123 Field 11K, 13H, 13J
CFSTI Prices: HC$4.00 MF$1.00

Wyandotte Chemicals Corp., Mich.
APPLICATION OF CHEMICAL DESCALANTS TO HIGH PRESSURE MARINE BOILERS,
Final summary rept. for 1 Aug 60-31 Dec 61,
by Leslie R. Bacon and A. Korczak. 31 Dec 61, 132p
Contract NObs84149, Proj. SR007 08 04, Task 614
Unclassified report

Continuation of Contract NObs72059.
Available copy will not permit fully legible reproductions.

Descriptors: (*Boiler compounds, Corrosion inhibition), (*Corrosion inhibition, Boiler compounds), Boiler tubes, Boilers, Corrosion, Marine propulsion, Scale, Cleaning, Organic solvents, Thiourea, Sulfamic acids, Stainless steel, Steel, Copper, Oxidation.

A technical specification is developed for procurement of a scale-removing compound designated Descalant 3,17, based on sulfamic acid, citric acid and diethylthiourea (DETU). This product is well suited for use by ships' personnel for descaling boilers. Work under two contracts leading to this formula is summarized. Recent studies were concerned particularly with choices to be made among grades of raw materials, as reflected by compatibility behaviors and storage tests under several environments and packaging conditions. Refinements in procedures and interpretation of storage tests were developed. Analytical methods for the determination of each ingredient were considerably studied, and some interlaboratory testing done. Unresolved difficulties developed at a late stage in respect to the pentabromacetone method for citric acid when applied to old formulations. However, the method is specific for citric acid and (at least for freshly blended formulas) more accurate than an earlier non-specific method based on titration.

AD-296 050 Field 11E
CFSTI Price: HC$2.00

IIT Research Inst., Chicago, Ill.
GLASS FIBER STRENGTH ENHANCEMENT THROUGH BUNDLE DRAWING OPERATIONS.
Quarterly progress rept. no. 2, 7 Sep-7 Dec 62,
comp. byR. H. Cornish. 7 Dec 62, 29p
Rept. no. 8263-2
Contract N600 19 58450, Proj. K263
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Glass textiles, Drawing (Machine processing)), Metal coatings, Surface-active substances, Lead alloys, Indium alloys, Impurities, Titanium, Zirconium, Tensile properties, Controlled atmospheres, Glass.

The report describes progress during the second quarterly period. Strength studies were interrupted while awaiting completion of the chosen fiber tester and modification of the fiber drawing apparatus to facilitate drawing, capturing and mounting, and testing of virgin fibers in an inert atmosphere without exposure to the outside atmosphere. Wetting-dewetting studies were continued on the doped brazing alloys and doped 80 Pb-20 In using both pure Ti or Zr and a combination thereof. Metallizing techniques were extended to drawing of precoated rods both with and without glass sheaths to produce metallized fibers. Improvement and modification of the apparatus for coating as-drawn fibers were completed. Bundle drawing investigations centered about drawing of the simplest combinations of glass rods in a metal matrix contained in sheath. Basic feasibility of glass wetted with metal for redrawing operations was established. (Author)

AD-421 738 Field 11F, 13H
CFSTI Price: HC$3.00

Southern Research Inst., Birmingham, Ala.
DEVELOPMENT OF HIGH STRENGTH AND FRACTURE TOUGHNESS IN STEELS THROUGH STRAIN-INDUCED TRANSFORMATIONS.
Summary technical rept. for 2 Jul 62-30 Jun 63,
by J. D. Morrison, M. A. Campbell, and J. R. Kattus.
5 Sep 63, 95p
Contract DA01 009ORD1070, Proj. 59332008
WAL TR-323.4/2-3;N64 13868
Unclassified report

Descriptors: (*Stainless steel, Mechanical properties), (*Cold working, Stainless steel), Tensile properties, Toughness, Fracture (Mechanics), Heat treatment, Temperature, Austenite, Rocket cases, Low-temperature research, Carbides, Microstructure, Hardness,

Manganese alloys, Silicon alloys, Chromium alloys, Nickel alloys, Molybdenum alloys, Titanium alloys, Carbon alloys, Steel, Phase studies, Deformation.

An investigation was made to determine the effects of variations in alloy content, cold-working temperature, and amount of cold work, on the tensile and toughness properties of metastable austenitic stainless steels. The purpose of this program was to arrive at an alloy composition and processing procedure that results in an optimum combination of strength and toughness in a structural sheet material that can be used in the fabrication of highly stressed structures, such as rocket motor casings. It was found that the optimum combination of high yield strength and fracture toughness is obtained by cold working alloys containing about 0.04% to 0.05% carbon. The effect of post-deformation heat treatments on the properties of the cold-worked stainless steels was found to be a function of the amount of deformation. In standard Type 301 stainless steel cold reduced 40% to 50%, precipitation of fine carbides in transformed (martensitic) areas was evident after exposure to 800 F for 24 hr. (Author)

AD-423 551 Field 11F
CFSTI Price: HC$4.00

Air Products and Chemicals, Inc., Allentown, Pa.
THE COMPATIBILITY OF VARIOUS METALS WITH LIQUID FLUORINE.
Rept. for 15 Oct 60-15 Oct 61,
by Sidney Kleinberg and James F. Tompkins.
Mar 62, 125p
Contract AF33 616 6515, Proj. 7312, Task 731202
ASD TDR-62-250
Unclassified report

Descriptors: (*Fluorine, Corrosion), (*Metals, Corrosion), (*Powder metals, Corrosion), (*Fluorides, Corrosion), (*Corrosive gases, Fluorine), (*Corrosion, Fluorine), Surfaces, Films, Impurities, Liquefied gases, Handling, Mechanical properties, Low-temperature research, Spectra (Infrared), Solubility, Electron diffraction analysis, Tables, Compatibility.

This report covers studies of liquid F and its contaminants, reactions on metal surfaces, fluoride films, and immersion tests of tensile specimens. A method of preparing contaminant free F and its IR analysis is discussed. No liquid phase reaction between F and metals was observed but gas phase reaction occurs during warmup. Small weight changes in metal specimens immersed in liquid F for 15 and 75 minutes were noted. Exposure of hydrocarbon films on metals to F2 leaves carbon deposits while exposure to ClF3 or ClF3 + F2 leaves fluorocarbon films. No detectable F films formed on Al specimens using electron diffraction techniques. At low temperatures gaseous F formed films of less than 200 Angstroms on metal powders with initially rapid film formation tapering off to a negligible rate after one day. Metal powders absorb gaseous fluorine at -279 F. Metal tensile specimens exposed to liquid F for one year corroded less than one mil. These specimens had essentially the same tensile properties as similar ones exposed to liquid N. (Author)

AD-443 073 Field 11G, 11J, 13H
CFSTI Price: HC$2.00

Quantum, Inc., Wallingford, Conn.
STUDIES OF LOW FRICTION COATINGS FOR VULCANIZED ELASTOMERS.
Progress rept. no. 1, 8 Apr-8 Jul 64,
by Richard F. Horan. 8 Jul 64, 26p
Contract NObs90313, Proj. SR007 03 03, Task 1003 5
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Elastomers, Surfaces), (*Plastic coatings, Surfaces), (*Friction, Surfaces), (*Surfaces, Friction), Vulcanizates, Butyl rubber, Halocarbon plastics, Chlorine compounds, Polyethylene plastics, Nitrile rubber, Photolysis, Photochemistry, Ultraviolet radiation, Surface properties, Mechanical properties, Tensile properties, Test methods, Test equipment, Processing, Synthetic rubber.

Studies have been initiated in low cost processes which produce low-friction surfaces on natural and synthetic vulcanized elastomers. Butyl rubber was chosen as the first saturated elastomer to be treated by photolytic graft polymerization of chlorinated monomer to the surface of the rubber. Ten specific treatments have demonstrated a five-fold increase in wear life on a high-speed rotary wear tester as a result of having low friction surfaces. Of the two chlorinated monomers tested as surface grafting agents, trichlorethylene appears to have less effect than perchlorethylene on the tensile properties of treated elastomers. (Author)

AD-449 603 Field 11B, 21H
CFSTI Price: HC$5.00

Army Materials Research Agency, Watertown, Mass.
PROCEEDINS OF THE ROCKET NOZZLE MATERIALS SYMPOSIUM.
Monograph series.
12 Jun 62, 151p AMRA MS-63-06
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Rocket motor nozzles, Materials), (*Refractory materials, Rocket motor nozzles), Refractory coatings, Coolants, Graphite, Tungsten, Fibers, Peformance (Engineering), Symposia, Tests, Rocket motors (Solid propellant).

Contents:
Rocket nozzle erosion and materialsresearch
Refractory materials development.

Patent 3,174,931 Field 11H

GREASE COMPOSITIONS.
Patent assigned to Sinclair Research, Inc.,
Wilmington, Del.,
by Howard J. Matson, John W. Nelson, and
Martin M. McCormick. 23 Mar 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Greases, Lubricant additives), (*Lubricant additives, Organic phosphorus compounds), (*Organic phosphorus compounds, Lubricant additives), (*Halogen compounds, Organic phosphorus compounds), Phenols, Polycyclic compounds, Organic sulfur compounds, Oils, Fatty acids, Patents.

Halogen derivatives of phenolic-phosphorous compounds are added to grease compositions to improve dropping point, extreme pressure, bleed and oxygen stability characteristics. The grease contains a synthetic or mineral oil base thickened with a metal base fatty acid soap containing from 0.1 to 10 weight percent of a halogen derivative of phenolic-phosphorous com-

pounds. The derivatives used are condensation products of bisphenols such as 2,2-bis(halo-4-hydrosyphenol) propane with a monophenol or thiophenol and a phosphorus halide.

Patent 3,174,932 Field 11H

LUBRICATING COMPOSITIONS.
Patent assigned to Esso Research and Eng.,
by Arnold J. Morway. 23 Mar 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Greases, Calcium compounds), (*Lubricants, Calcium compounds), (*Calcium compounds, Lubricants), (*Complex compounds, Lubricants), Oils, Carboxylic acids, Salts, Preparation, Patents.

Grease compositions containing from 10 to 50 weight percent of a dehydrated calcium complex salt have good extreme pressure characteristics, stability, penetration, and dropping point. The grease contains a synthetic or mineral lubricating oil and a dehydrated complex of a calcium salt of low molecular weight saturated monocarboxylic acid having from 1 to 3 carbon atoms per molecule, and a calcium salt of intermediate molecular weight straight chain monocarboxylic acid having from 7 to 10 carbon atoms per molecule. The calcium complex salts of low and intermediate molecular weight are in a mol ratio of 4:1 to 12:1, being formed at a temperature of 400 to 500F.

Patent 3,175,972 Field 11H

LUBRICANT COMPOSITION AND METHOD.
Patent assigned to Phillips Petroleum Co.,
by Bill Mitacek and John P. Graham. 30 Mar 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Lubricant additives, Polyethylene plastics), (*Polyethylene plastics, Lubricant additives), Lubricants, Aliphatic compounds, Polycyclic compounds, Salts, Organic sulfur compounds, Halogenated hydrocarbons, Preparation, Patents.

Ethylene polymers, having a density of 0.940 to 1.000 gram per cc. at 25 degrees C., are added to paraffinic lubricating oils for high pressure applications to improve storage stability and lubricity. From 0.1 to 5 percent by weight of a solid polymer of ethylene and a copolymerizable 1-olefin having from 3 to 8 carbon atoms is dispersed in the oil base at temperatures ranging from 325 to 450 degrees F. The composition is cooled below 200 degrees F., and a mixture of sulfurized fatty oils, chlorinated paraffinic waxes, and a heavy, polyvalent, e.g., lead, metal naphthenate is added as an extreme pressure ingredient. The extreme pressure additive is from 0.5 to 45 percent by weight of the total composition.

Patent 3,178,367 Field 11H, 7B, 7C

METHOD OF PREPARING FINELY DIVIDED SOLID METAL SALTS.
Patent assigned to Esso Research and Engineering Co.,
by Alan S. Dubin and Jerome Panzer. 13 Apr 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Inorganic acids, Salts), (*Fatty acids, Salts), (*Lubricant additives, Antioxidants), (*Greases, Antioxidants), Calcium compounds, Acetates, Phosphates, Sodium compounds, Solids, Metals, Patent.

Finely divided metal salts such as calcium acetate and trisodium phosphate are added to lubricating oils and greases to provide rust prevention, oxidation inhibition, etc. The metal salt is of an acid selected from the group consisting of C2 to C4 fatty acids and inorganic mineral acids. A solution is made from the salt and a solvent; then a second solvent, miscible with the first solvent but in which the salt is insoluble, is added to cause the salt to precipitate. The mixture is then added to a lubricating oil, and the solvents are removed.

Patent 3,180,828 Field 11H, 13H

LUBRICANT FOR USE IN THE HOT EXTRUSION OF METALS AND METAL ALLOYS.
by Ian Griffith Slater and Oswald Pritchard Nicholson. 27 Apr 65 Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Lubricants, Extrusion), (*Extrusion, Lubricants), Patents, Metals, Alloys, Basalt, Hot working.

A composition containing more than 75 percent of a geologically unaltered basaltic rock is used as a lubricant in the hot extrusion of metals and metal alloys. The basaltic rock is crushed and fluidized by heat. It is then cooled slowly and chrushed again into granular form. The basaltic rock should not contain any sulphur or fluorine-bearing minerals. 9 claims.

PB-167 266 Field 11B, 20M
CFSTI Prices: HC$2.00 MF$0.50

Owens-Illinois Technical Center, Toledo, Ohio.
THE AXIAL THERMAL EXPANSION OF TETRAGONAL ZIRCONIA BETWEEN 1150 AND 1700C,
by S. M. Lang. Apr 64, 29p
Contract AF33 616 7470, Proj. 7022, Task 702202
ARL 64-63; AD 442 281
Unclassified report

Descriptors: (*Thermal expansion, Zirconium compounds), (*Zirconium compounds, Oxides), Dioxides, Symmetry (Crystallography), Beryllium compounds, Ceramic materials, Crystal lattices, Transformations, Experimental data, Statistical analysis, X-ray diffraction analysis.

The lattice constants for the tetragonal form of three different samples of zirconium dioxide (ZrO_2) were measured in a high-temperature x-ray diffractometer in the temperature range from about 1150 to about 1700C in a normal barometric air atmosphere. Within the accuracy and precision limits of the diffraction measurements, the calculated lattice constants were the same for the three source materials but only after each had been subjected to a prior heat-treatment at 1550 to 1750C in a normal barometric air atmosphere.

PB-167 267 Field 11H
CFSTI Prices: HC$2.00 MF$0.50

Institute of Research, Lehigh Univ., Bethlehem, Pa.

BASIC FACTORS IN THE FORMATION AND STABILITY OF NON-SOAP GREASES FOR HIGH TEMPERATURE APPLICATIONS.
Rept. for 1 Apr 63-28 Feb 64,
by John J. Chessick, A. C. Zettlemoyer, and Y-K Lui.
Mar 64, 39p
Contract AF33 657 10359, Proj. 7343, Task 734301
ML TDR-64-132 P1; AD 447 822
Report on Aerospace Lubricants. Unclassified report

Descriptors: (*Greases, Stability), (*Lubricants, Stability), Colloids, High temperature research, Titanium compounds, Dioxides, Aromatic compounds, Hydrocarbons, Alcohols, Particles, Scattering, Adsorption, Polymers, Thermodynamics, Coatings, Sedimentation, Water, Lubricant additives, Carbon black.

The survival of non-soap greases under extreme environments, such as provided by working at elevated temperatures, depends in large measure on the interactions of the fluid with the fine particulate solids that are employed to form the thixotropic structure. Sometimes, water at the solid liquid interface is apparently involved. Work this year has been directed at a study of the influence of trace water on the dispersion of inorganic agglomerates, on a study of the nature of polymer adsorption onto inorganic solids, and on an analysis of new carbon black dispersion data. The results of experiments and the value of sedimentation data in non-soap grease technology are also discussed in a separate section. In the current work, organic vehicles have continued to be employed. A small amount of effort was expended on inorganic vehicles, but all of those examined had little stability to hydrolysis. When more suitable inorganic fluids become available, efforts on this project will center on them. (Author)

PB-167 329 Field 11F
CFSTI Prices: HC$3.00 MF$0.75

Ohio State Univ. Research Foundation, Columbus.
INVESTIGATION OF THE KINETICS AND MECHANISM OF THE OXIDATION OF TANTALUM AND OTHER REFRACTORY METALS.
Final rept. for Nov 60-Dec 62,
by James E. Buttles, Rudolph Speiser, and George St. Pierre. Jul 63, 74p
Contract AF33 616 7675, Proj. 7312, Task 731202
ADSD TDR-63-628 Unclassified report

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Descriptors: (*Refractory metals, Oxidation), (*Tantalum, Oxidation), (*Molybdenum, Oxidation), (*Tungsten, Oxidation), (*Niobium, Oxidation), Reaction kinetics, Spectrum analyzers, Mass spectroscopy, Nitrogen, Carbon dioxide, Molecular weight, Carbon compounds, Monoxides, Hydrogen, Water, Air, Thermodynamics.

A description is given of the modification made of the Bendix Mass Spectrograph to enable this instrument to determine the molecular weights of volatile refractory oxide-water complexes. A review is made of the present status of the fundamental aspects of the oxidation behavior of molybdenum, tungsten, niobium, and tantalum in gaseous atmospheres such as air, O2-N2, CO-CO2, and H2-H2O mixtures at elevated temperatures. (Author)

PB-167 363 Field 11I, 07C
CFSTI Prices: HC$3.00 MF$0.75

Dow Chemical Co., Midland, Mich.
PHENYLENE SULFIDE POLYMERS.
Interim rept. for Mar-Dec 62,
by Harry A. Smith and Carl E. Handlovits. Dec 62, 65p
Contract AF33 616 7251, Proj. 7340, Task 734004
ASD TDR-62-322 P2;AD 296 778 Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Organic sulfur compounds, Aromatic compounds), (*Aromatic compounds, Organic sulfur compounds), (*Polymers, Organic sulfur compounds), Sulfides, Polymerization, Chemical bonds, Bonding, Adhesion, Stability, Heat, Viscosity, Molecular weight, Crystal structure, Solubility, Metalorganic compounds, Copper compounds, Synthesis (Chemistry).

The investigation of phenylene sulfide polymers has been divided into seven areas of endeavor. These are monomer synthesis, polymerization studies, large scale preparations, physical properties of the linear polymer, chemical properties of the polymer, crosslinking studies, and applications. With improvements in the monomer synthesis and polymerization, one pound batches of polymer can be readily made. Once made, the polymer has a degree of polymerization in excess of 100 and is inert to air up to 300 C. It can be chemically crosslinked to improve its stability at 400 C in air or heat treated to not only improve its thermal and oxidative stability at 400 C but to improve its properties as well. The polymer can form fibers from the melt and be used in coatings and laminates. However, its most thoroughly investigated property is its adherence. Bond strengths up to 2700 psi have been obtained on 17-7 stainless steel. It also adheres well to glass and aluminum. (Author)

PB-167 385 Field 11B
CFSTI Prices: HC$1.00 MF$0.50

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
AN INVESTIGATION OF THE THEORETICAL AND PRACTICAL ASPECTS OF THE THERMAL EXPANSION OF CERAMIC MATERIALS.
Quarterly progress rept.,
by Kenneth M. Merz. 15 Mar 60, 13p
Rept. no. PI-1273-M-6
Contract NOrd18419 Unclassified report
AD 235 034

Available copy will not permit fully legible reproduction.

Descriptors: (*Ceramic materials, Thermal expansion), (*Thermal expansion, Ceramic materials), Aluminum compounds, Oxides, Magnesium compounds, Dilometers, Measurement.

Thermal expansion valves for the MgO-MgO.Al2O3 and Al2O3-MgO.Al2O3 systems were measured with a fused quartz dilatometer at a heating rate of 3C/min up to 1000C. The experimental results were plotted as weight-percent vs linear expansion coefficient. The experimental points of the MgO.Al2O3-Al2O3 system were within 5% of the theoretical curve calculated from Turner's equation (J. Research Natl. Bur. Standards 37:239-250, 1946). The observed thermal expansion coefficients for the MgO-MgO.Al2O3 were about 7% lower than the calculated curve. Comparisons with literature values indicated that the thermal expansion of a material can be decreased by adding a second material which has a lower coefficient of expansion and a higher modulus of elasticity. Possible explanations for the low values of the thermal expansion coefficients are: (1) the fact that the specimens were prepared by hydraulic pressing; (2) the large shrinkage observed in the high MgO specimens, and (3) the formation of microcracks on cooling from the firing temperature because of the large thermal stresses produced in the body.

PB-167 458 Field 11F
CFSTI Prices: HC$3.00 MF$0.75

Naval Ordnance Lab., White Oak, Md.
THE EFFECT OF PRESSURE ON MARTENSITIC REACTIONS IN LOW ALLOY STEELS,
by R. E. Predmore. 2 Jul 64, 59p NOLTR 64-105
Tasks FR46, FR73 Unclassified report
AD 447 576

Descriptors: (*Steel, Martensite), (*Martensite, High-pressure research), Transformations, Hydrostatic pressure, Microstructure, Hardness, Austenite, Grain structures (Metallurgy), Heat treatment, Chemical analysis.

The depression of the martensitic start temperature of 43XX steel by pressure was measured from cooling curves. A 3/4-inch, supported piston pressure vessel developed at NOL was used for the measurements. The martensitic start temperatures were predicted from the thermodynamic data. Photomicrographs showed that martensite formed in 43XX steel at high pressure was finer than normal martensite. The hardness of high pressure martensite is much greater than normal martensite. (Author)

PB-167 462 Field 11I, 07C
CFSTI Prices: HC$6.00 MF$1.50

Illinois Univ., Urbana.
HIGH POLYMERIC MATERIALS.
Rept. for 1 Feb-Dec 60,
by Carl S. Marvel, T. Moeller, and John C. Bailar, Jr.
Apr 61, 267p
Contract AF33 616 5486, Proj. 7340, Task 73404
WADD TR-61-12; AD 264 332
Unclassified report

Descriptors:(*Heat-resistant plastics, Synthesis (Chemistry)), (*Aromatic compounds, Polymerization), (*Phosphonitrile chlorides, Decomposition), (*Metal-organic compounds, Polymers), Pyridines, Heterocyclic compounds, Phenolic plastics, Thiazoles, Siloxanes, Organic phosphorus compounds, Organoboranes, Bromides, Fluorides, Amino plastics, Metallation, Complex compounds, Ketones, Silicon compounds, Aluminum compounds, Chlorides.

A series of polyaromatics was studied. All types show excellent thermal stability. A polymer prepared from diphenyl isophthalate and 3,3'-diaminobenzidine has excellent thermal and hydrolytic stability and attractive physical properties such as tensile, modulus, and elongation when tested in thin films. Aminolysis of tetrameric phosphonitrilic chloride yields di-,tetra-, or octasubstituted products, depending upon conditions. Synthesis of phosphonitrilic bromides was improved. The trimeric and tetrameric fluorides were obtained by methathesis in nitrobenzene. Metallated organic polymers were prepared from bis-salicylaldehydes and metallated polyamines. Complexes of salicylidene-ethanolamine were found to be unsuitable for preparation of thermally stable polymers. Coordination polymers of bis-(beta-diketones) are shown to exhibit a variety of bond types. Polymers made by condensation of polyhydroxy compounds with silicon and aluminum chlorides are thermally unstable. (Author)

PB-167 480 Field 11D, 20K
CFSTI Prices: HC$2.00 MF$0.50

Naval Ordnance Lab., White Oak, Md.
SOME PROPERTIES OF NOL RINGS OF CARBON-BASE FIBERS AND EPOXY RESIN,
by S. P. Prosen. 4 Dec 64, 26p NOLTR-64-183
Task RREN ST204 212 5 0000
AD 454 635
Unclassified report

Descriptors: (*Composite materials, Tensile properties), (*Carbon, Fibers), (*Epoxy plastics, Composite materials), Rayon, Pyrolysis, Compressive properties, Shear strength, Filaments, Test equipment.

The recent improvement in the strength and the modulus of carbon-base fibers indicates that such fibers will soon compete with glass in composite structures where light weight is important. Carbon fibers, made by the pyrolysis of rayon yarn, were evaluated in the NOL ring form. A composite tensile strength of 5600 kg/sq cm (80,000 psi), a compressive strength of over 7000 kg/sq cm (100,000 psi), and shear strengths of over 350 kg/sq cm (5000 psi) were measured. A compressive modulus of over 280,000 kg/sq cm (4,000,000 psi) was also determined. Several ring fabrication difficulties were encountered, with poor wetting and some fuzzing due to broken filaments causing the most trouble. The rings were somewhat porous, but in general the rings were satisfactory. (Author)

SB-480 Suppl. 1 Field 11E

Clearinghouse for Federal Scientific and Technical Information, Springfield, Va.
TEXTILE FIBERS.
Price list, selective bibliography of government research repts. and translations for Sep 61-Dec 64.
Dec 64, 24p Unclassified report

Available free from the Clearinghouse.

Descriptors: (*Fibers, Textiles), (*Bibliographies, Fibers), Fibers (Synthetic), Cordage, Fatigue (Mechanics), Wear resistance, Degradation, Cotton, Dyes, Spinning, Thermal properties, Finishes and finishing.

Lists 364 foreign and domestic references on fibers, general, synthetic fibers, threads and cordage added to the CFSTI collection during the period September 1961 through December 1964. Includes research on: testing for fatigue, wear resistance, crease resistance, and deterioration of fibers; water resistance for cotton threads; dyeing and spinning of fibers; improvement of thermal stability; antistatic finishes and nonwoven fibrous products.

SB-481 Suppl. 1 Field 11E, 13I

Clearinghouse for Federal Scientific and Technical Information, Springfield, Va.
TEXTILE FABRICS AND RELATED RESEARCH.
Price list, selective bibliography of Government research repts. and translations for Sep 61-Dec 64.
Apr 65, 23p Unclassified report

Available free from the Clearinghouse.

Descriptors: (*Textiles, Bibliographies), (*Bibliographies, Textiles), Textile industry, Cotton textiles, Woolen textiles, Rayon, Nylon, Orlon, Dacron, Fibers, Parachute fabrics, Cordage, Finishes and finishing, Dyes, Machines.

Lists 432 domestic and foreign references on textile fabrics and related research added to the CFSTI collection from September 1961 through December 1964. Reports are listed in the following categories: Fabrics, General; Cotton; Wool; Rayon; Nylon; Orlon; Dacron; Parachute Fabrics and Webbing; Textile Finishes; Dyes; and Textile Machinery. (Author)

12. Mathematical Sciences

AD-278 478 Field 12B, 5C, 12A, 16B
CFSTI Price: HC$7.00

RAND Corp., Santa Monica, Calif.
APPLIED DYNAMIC PROGRAMMING,
by Richard E. Bellman and Stuart E. Dreyfus.
May 62, 379p Rept. no. R-352-PR
Contract AF49 638 700

Unclassified report

Rept. on Proj. RAND.
Available copy will not permit fully legible reproduction.

Descriptors: (*Dynamic programming, Decision theory), (*Trajectories, Optimization), (*Inventory control, Dynamic programming), Mathematical models, Scheduling, Search theory, Calculus of variations, Stochastic processes, Partial differential equations, Sequences, Economics, Industries.

Problems that given rise to sequences of functions of one and two variables are considered. It is shown that dimensionality difficulties may be solved by use of a Lagrange multiplier. Analytic and computational solutions to various classes of smoothing and scheduling processes are presented. The dynamic programming problems that arise in the course of the computational solution of dynamic programming problems are studied. The theory of dynamic programming is shown to provide a simple treatment of the theory of variational problems involving functions of one independent variable. The principle of optimality yields a nonlinear partial differential equation from which all the classical results are obtained. The determination of optimal trajectories is discussed and numerical solutions are given. The optimal utilization of a complex of interdependent industries is considered. The flowering theory of control processes is discussed. Optimization processes with linear equations and quadratic criteria, and Markovian decision processes are discussed. Results on the accuracy and stability of dynamic programming techniques are given.

AD-280 909 Field 12A
CFSTI Price: HC$1.00

RAND Corp., Santa Monica, Calif.
ON A NEW APPROACH TO THE COMPUTATIONAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS,
by Richard Bellman, Robert Kalaba, and Bella Kotkin. May 62, 13p Rept. no. RM-3133-PR
Contract AF49 638 700

Unclassified report

Rept. on Proj. RAND.
Available copy will not permit fully legible reproduction.

Descriptors: (*Partial differential equations, Numerical analysis), (*Numerical analysis, Partial differential equations), Programming (Computers), Programming languages, Recursive functions.

The most versatile and frequently employed method for the numerical solution of partial differential equations is that of approximation by difference equations. While the method has the advantages of conceptual simplicity, wide applicability, and ready suitability for digital computation, it also has the disadvantages of a predilection toward instability and of a frequent requirement for large storage capacity and excessive computing time. In this Memorandum the authors indicate a modified approach which may be superior in some instances. Considering a particular equation, they replace the usual difference approximation by a recurrence relation that clearly preserves such properties as boundedness and nonnegativity and that tends to the solution in the limit. Results of a FORTRAN program are discussed.

AD-281 256 Field 12B, 12A
CFSTI Price: HC$1.00

RAND Corp., Santa Monica, Calif.
A NOTE ON DYNAMIC PROGRAMMING AND PERTURBATION THEORY,
by Richard Bellman. Jun 62, 13p
Rept. no. RM-3169-PR
Contract AF49 638 700

Unclassified report

Rept. on Proj. Rand.
Available copy will not permit fully legible reproduction.

Descriptors: (*Dynamic programming, Nonlinear differential equations), (*Nonlinear differential equations, Dynamic programming), (*Perturbation theory, Nonlinear differential equations), Calculus of variations.

The technique of dynamic programming is used to derive a new type of perturbation expansion in the solution of nonlinear differential equations. The method can be applied to systems of differential equations which arise as the Euler equations of variational problems.

AD-283 430 Field 12A
CFSTI Price: HC$3.00

Mathematics Research Center, Univ. of Wisconsin, Madison.
TAUBERIAN THEOREMS,
by Jose M. Gonzalez-Fernandez. Jun 62, 54p
Technical summary rept. no. MRC-TSR-324
Contract DA11 022ORD2059
N63 14453

Unclassified report

Descriptors: (*Series, Theorems), Power series, Special functions (Mathematical).

The classical tauberian theorem for power series of Hardy and Littlewood is generalized.

AD-429 018 Field 12A
CFSTI Price: HC$1.00

RAND Corp., Santa Monica, Calif.
HIGHER-ORDER APPROXIMATIONS TO THE COMPUTATIONAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS,
by Stanley Azen. Jan 64, 16p
Rept. no. RM-3917-ARPA
Contract SD79, ARPA Order 189 61
N64 14774

Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Partial differential equations, Numerical analysis), (*Numerical analysis, Partial differential equations), Difference equations, Functions, Polynomials, Programming (Computers), Programming languages.

Two techniques of approximating the solution to a partial differential equation are investigated. Using the first of these, the solution is approximated at each stage by a higher-order difference algorithm. The second

technique is that of storing the function at each stage by a polynomial. Numerical results were obtained from a FORTRAN program applying these techniques to the equation u sub t = uu sub x.

PB-167 093 Field 12A, 20F
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
THE BOUNDARY LAYER FORMALISM FOR CONVERGENT SERIES SOLUTIONS OF THE WAVE EQUATION WITH REFERENCE THE FOCUSING OF DISCONTINUITIES, PART 1,
by Robert N. Buchal. Dec 60, 24p
Technical summary rept. no. MRC-TSR-199
Contract DA11 022ORD2059
AD 252 721

Unclassified report

Descriptors: (*Partial differential equations, Series), (*Series, Partial differential equations), Integral transforms, Boundary layer, Diffraction.

A technique is presented for explicitly constructing solutions of the wave equation whose nonanalyticities are confined to wave fronts. The initial data are analytically continued to a later time using the jump conditions across surfaces carrying nonanalyticities. The practical advantage of the technique is that the first terms of the initial series determine the first terms of the representations of the solution valid in all regions. In all, these terms approximate the solution for bounded time in a full neighborhood of the wave fronts including the focus. (Author)

PB-167 101 Field 12B
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
SIMULTANEOUS SYSTEMS SUBJECTED TO STATISTICAL DISTURBANCES,
by Enders A. Robinson. Sep 60, 8p
Technical summary rept. no. MRC-TSR-192
Contract DA11 022ORD2059
AD 245 954

Unclassified report

Descriptors: (*Mathematical models, Control systems), Statistical processes, Simulation, Feedback, Operations research.

PB-167 311 Field 12A
CFSTI Prices: HC$2.00 MF$0.50

New York Univ., N. Y. School of Engineering and Science.
A GEOMETRIC APPROACH TO THE STUDY OF THRESHOLD FUNCTIONS,
by Philip Kaszerman. Jan 63, 34p
Technical rept. no. TR-400-70
Grant AF AFOSR62 152

Unclassified report

Descriptors: (*Mapping (Transformations), Geometry), (*Special functions (Mathematical), Mapping (Transformations)), Functional analysis, Mathematical logic.

A geometric approach to the study of threshold functions is presented. Use is made of a systematic display of parallel x sub 1 - x sub 2 planes in n-dimensional Euclidean space which contain vertices of the unit hypercube as described by M. E. Arthur (1961). This display is treated as a map upon which any Boolean function may be shown by circling the true vertices. It is also noted that a threshold function is a linearly separable function; that is, the true vertices are separable from the false by a hyperplane. The intersection of this hyperplane with each parallel plane of the map appears as a line. A set of three necessary and sufficient conditions that lines on the map represent a hyperplane, i.e., that the Boolean function be a threshold function, is given. Since no two of these conditions imply a third, they are an independent set. Methods of testing the mapping of a function for the three conditions are presented. It is also shown that the residue theorem in threshold logic implies two of the conditions. (Author)

PB-167 312 Field 12A
CFSTI Prices: HC$3.00 MF$0.75

New York Univ., N. Y. School of Engineering and Science.
A NOTE ON THE QUANTIZATION OF TWO-DIMENSIONAL LINE DRAWINGS,
by Jeremy M. Glass. Feb 63, 72p
Technical rept. no. TR-400-66
Grant AF AFOSR24 63

Unclassified report

See also PB-167 315.

Descriptors: (*Graphics, Curve fitting), (*Geometric forms, Statistical analysis), Geometry, Curved profiles, Probability, Distribution theory, Sampling.

The representation of continuous line drawings by straight-line segments (chains) is seen to be a quantization process. The chains are obtained by assigning certain of the nodes of a cartesian grid to represent the drawing, and then joining the selected nodes by straight lines. Methods are discussed for establishing criteria to determine the quality of the quantized approximation in terms of the grid size q. One approach considers an ensemble of drawings represented by probability density (PD) functions; and quantization acts on the continuous PD to produce a discrete PD. The statistical approach does not appearto be easily adapted to methods other than square-box quantizing. A more geometrical approach involves the use of the distance N sub d separating drawing and quantized curve, and normal to the drawing. N sub d squared is then used as a measure of the quality of the approximation in the mean square sense. A 'sampling theorem approach,' is discussed whereby ways are considered for reconstructing the drawing from the quantized parametric curves of the drawing. (Author)

PB-167 313 Field 12A, 9B
CFSTI Prices: HC$2.00 MF$0.50

New York Univ., N. Y. School of Engineering and Science.
PROPERTIES OF THRESHOLD FUNCTIONS DERIVED BY THE USE OF ARTHUR'S GEOMETRIC MAP,
by Philip Kaszerman. Jul 62, 35p
Technical rept. no. TR-400-63
Grant AF-AFOSR62 152

Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Mapping (Transformations), Geometry), (*Special functions (Mathematical), Mapping (Transformations)), Functional analysis, Mathematical logic, Switching circuits, Computer logic.

Threshold functions are studied using geometric techniques. Rather than consider the defining hyperplane in n-dimensional space, the approach presented here examines the lines which are the intersections of the hyperplane with an appropriate set of two dimensional planes. Arthur's Geometric Map is used for this purpose. Theorems are derived describing the fundamental properties of the mapping of the boundary condition of a threshold device. The boundary condition, as plotted on the map, consists of a set of parallel lines with the same 'true' sides. A fairly restrictive (and therefore useful) necessary condition for realizability of a Boolean function by a threshold device is given in terms of the function's mapping. Further theorems compare unateness with the boundary condition. It is also shown that if a Boolean function satisfies the residue theorem, then there exist parallel lines to separate the true from the false vertices. (Author)

PB-167 315 Field 12A, 9B
CFSTI Prices: HC$3.00 MF$0.75

New York Univ., N. Y. School of Engineering and Science.
DIGITAL COMPUTER ANALYSIS OF ARBITRARY THREE-DIMENSIONAL GEOMETRIC CONFIGURATIONS,
by Kenneth Ruttenberg. Oct 62, 58p
Technical rept. no. TR-400-69
Grant AF AFOSR62 152
Unclassified report

Available copy will not permit fully legible reproduction. See also PB-167 312.

Descriptors: (*Geometric forms, Programming (Computers)), (*Programming (Computers), Geometric forms), (*Graphics, Curved profiles), Digital computers, Projective geometry.

A procedure is developed for the quantization and encoding of three-dimensional arbitrary geometric curves and surfaces. The arbitrary curves and surfaces are encoded in terms of straight line segments connecting nodes on a rectangular grid. Once the three-dimensional curves and surfaces have been encoded, properties of these curves and surfaces are readily determined. Algorithms are developed to determine projections of curves, whether a curve is planar, the length of a curve, maximum excursions of a curve, the distance between two points on a curve, possible symmetry of a curve about specified planes, and the intersections between two curves. Algorithms are also developed to determine the volume, first-order moments about specified planes, and moments of inertia about specified planes of surfaces. (Author)

PB-167 353 Field 12A
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monic, Calif.
FORMAL SOLUTIONS OF ANALYTIC DIFFERENTIAL EQUATIONS,
by Richard Bellman. May 62, 14p
Rept. no. RM-3147-PR
Contract AF49 638 700
AD 281 435
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Nonlinear differential equations, Theory), Functions, Matrix algebra, Invariance, Algebra.

The asymptotic behavior over time of the solutions of nonlinear differential equations is a problem of continuing importance. In this paper, the author uses the concept of relative invariants to obtain some simple and useful representations of the solutions.

PB-167 360 Field 12A
CFSTI Prices: HC$1.00 MF$0.50

International Business Machines Corp., New York.
AN ELEMENTARY MATHEMATICAL THEORY OF CLASSIFICATION AND PREDICTION,
by T. T. Tanimoto. 17 Nov 58, 12p
Unclassified report

Descriptors: (*Mathematical prediction, Theory), (*Decision theory, Distribution), Scientific research, Medical research, Classification.

PB-167 406 Field 12B, 12A
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
NOTES ON LINEAR PROGRAMMING: PART II. DUALITY THEOREMS,
by George Dantzig and Alex Orden. 30 Oct 53, 9p Rept. no. RM-1265 Unclassified report
AD 114 135
Rept. on Proj. RAND.
Available copy will not permit fully legible reproduction.
Descriptors: (*Linear programming, Inequalities), (*Inequalities, Linear programming), Game theory, Matrix algebra, Theorem.

The simplex procedure yields as a natural by-product proofs of several important theorems concerned with 'Duality' in the field of linear inequalities which are demonstrated here. (Author)

PB-167 413 Field 12B, 05A, 14A
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
A NETWORK FLOW COMPUTATION FOR PROJECT COST CURVES,
by D. R. Fulkerson. 18 Mar 60, 30p
Rept. no. P-1947 Unclassified report
AD 224 315

Descriptors: (*Linear programming, Management planning), (*Costs, Management planning), Operations research, Networks, Optimization.

A network flow method is outlined for solving the linear programming problem of computing the least cost curve for a project composed of many individual jobs, where it is assumed that certain jobs must be finished before others can be started. Each job has an associated crash completion time and normal completion time, and the cost of doing the job varies linearly between these extreme times. Given that the entire project must be completed in a prescribed time interval, it is desired to find job times that minimize the total project cost. The method solves this problem for all feasible time intervals. (Author)

PB-167 468 Field 12A
CFSTI Prices: HC$2.00 MF$0.50

Princeton Univ., N. J.
OLD AND NEW METHODS OF ESTIMATION AND THE PARETO DISTRIBUTION.

Econometric Research Program Research Memo,
by Richard E. Quandt. 9 Oct 64, 36p ERP-RM-70
Grants NSF GS551, NSF G24462

Unclassified report

Descriptors: (*Statistical distributions, Sampling), Curve fitting, Statistical functions, Stochastic processes, Statistical tests.

PB-167 472 Field 12B, 05A
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
NOTES ON LINEAR PROGRAMMING. PART XXXII: SOLVING THE TRANSPORTATION PROBLEM,
by L. R. Ford, Jr. and D. R. Fulkerson.
20 Jun 56, 21p Rept. no. RM-1736
AD 111 816

Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Linear programming, Transportation), (*Transportation, Linear programming), Combinatorial analysis, Iterative methods, Scheduling, Matrix algebra, Operations research.

A simplified description of a new computing procedure for the Hitchcock-Koopmans transportation problem is given, together with a step-by-step so.ution of an illustrative example. The procedure is based on Kuhn's combinatorial algorithm for the assignment problem and a simple 'labeling process' for solving maximal-flow problems in networks. The proposed computation appears to be considerably more efficient than the specialized form of the simplex method which is in common use.

PB-167 473 Field 12B
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
NOTES ON LINEAR PROGRAMMING: PART XI: COMPOSITE SIMPLEX DUAL SIMPLEX ALGORITHM, I,
by George B. Dantzig. 26 Apr 54, 20p
Rept. no. RM-1274 Unclassified report
AD 114 140
Available copy will not permit fully legible reproduction.

Descriptors: (*Linear programming, Optimization), Matrix algebra, Iterative methods, Operations research.

This paper presents an idea by E. M. L. Beale for avoiding certain undesirable features of phase I of the simplex method, namely, the introduction of vectors in the basis that are not likely to be in the optimal solution of phase II.

PB-167 493 Field 12B
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
NOTES ON LINEAR PROGRAMMING: PART XXXIII. A THEOREM ON FLOWS IN NETWORKS,
by David Gale. 22 Jun 56, 23p Rept. no. RM-1737
AD 112 371

Unclassified report

Available copy will not permit fully legible reproduction. Rept. on Proj. RAND.

Descriptors: (*Linear programming, Theorems), Combinatorial analysis, Set theory, Transportation, Networks, Operations research.

For a given set of origins and destinations connected by a network of edges of specified finite capacity, there is obtained a simple necessary and sufficient condition for the existence of a flow from the origins to the destinations, such that the flows into the destinations attain prescribed values. The existence theorem, which generalizes a well-known combinatorial theorem of P. Hall, is then applied to a particular example.

PB-167 494 Field 12B
CFSTI Prices: HC$6.00 MF$1.50

RAND Corp., Santa Monica, Calif.
SOME ASPECTS OF THE MATHEMATICAL THEORY OF CONTROL PROCESSES,
by R. E. Bellman, I. Glicksberg, and O. A. Gross.
16 Jan 58, 264p Rept. no. R-313
AD 158 407

Unclassified report

Available copy will not permit fully legible reproduction. Rept. on Proj. RAND.

Descriptors: (*Control, Theory), (*Mathematics, Control), Operations research, Equations, Stability, Calculus of variations, Functional analysis, Dynamic programming, Game theory, Inventory control, Stock level control.

PB-167 495 Field 12B
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
NOTES ON LINEAR PROGRAMMING: PART VII. THE DUAL SIMPLEX ALGORITHM.
Revised ed.,
by George B. Dantzig. 3 Jul 54, 14p
Rept. no. RM-1270
AD 114 139

Unclassified report

Revision of manuscript submitted 3 May 54.
Available copy will not permit fully legible reproduction.
Rept. on Proj. RAND.

Descriptors: (*Linear programming, Optimization), Iterative methods, Matrix algebra, Operations research.

Due to C. E. Lemke, this method is closely analogous to the simplex algorithm except that here the variables associated with a basis may have negative as well as positive values in the iterative process before an optimum is reached. Thus, a procedure is available for solving the dual problem without rearranging the original system--indeed, as we shall see by varying only some of the procedural steps of the revised simplex method.

13. Mechanical, Industrial, Civil, and Marine Engineering

AD-256 377 Field 13H, 01C
CFSTI Price: HC$3.00

Materials Advisory Board, NAS-NRC, Washington, D. C.

ALTERNATIVE METHODS FOR MACHINING.
Progress rept. no. 3,
10 Mar 61, 74p MAB-139-M(M3)
Contract DA36 039sc76436
Unclassified report

Rept. of Panel on Machining. Available copy will not permit fully legible reproduction.

Descriptors: (*Machining, Reviews), Spark machining, Chemical machining, Material removal, Ultrasonic radiation, Electron beams, Tensile properties, Aerospace craft, Aircraft.

A survey was made of alternative methods of stock removal used by research and development organizations. The methods include electrical discharge machining, electrolytic grinding, electrolytic machining, chemical milling, ultrasonic machining, and electron-beam machining.

AD-447 721 Field 13C, 13F, 13G
CFSTI Price: HC$1.00

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
PERFORMANCE TESTING OF A MODIFIED FIELD PLANER ON PROCESSED SNOW,
by Albert F. Wuori. Apr 63, 12p
Special rept. no. SR-53
Proj. 8S66 02 001, Tasks 022 02 006, 5010 02205
Unclassified report

Descriptors: (*Vehicles, Snow removal), (*Snow removal, Vehicles), Hydraulic systems, Snow, Tests, Planning surfaces, Runways, Performance (Engineering).

A Gurries field planer was tested at Houghton, Michigan as a means of leveling processed snow to produce a trafficable surface. The unit was a tow-type, hydraulically controlled, automatic leveler, used normally as a finish planer for airfield and highway construction work. It was modified to include skis for work in snow. The initial tests indicated the need for several modifications. They included a manual cross-slope and blade-height control, ski adjustment and an adjustable hydraulic valve. After these modifications were made, the planer was again tested and found to be a satisfactory implement for leveling processed snow. (Author)

AD-447 722 Field 13C, 13F
CFSTI Price: HC$2.00

Army Cold RegionsResearch and Engineering Lab., Hanover, N. H.
PERFORMANCE TESTING OF A SNOW BLAST PLOW,
by Edward R. Jackovich and Albert F. Wuori.
Apr 63, 30p Special rept. no. SR-41
Unclassified report

Descriptors: (*Vehicles, Snow removal), (*Snow removal, Vehicles), Snow, Ducts, Rotation, Blowers, Design, Tests, Performance (Engineering).

The Snowblast, a tractor-mounted rotary snow plow, was first tested on the Greenland Ice Cap during the 1958 and 1959 test seasons. The unit operated for a total of 50 hours, 17 of which were spent constructing six snow runway test sections. The model tested could be considered a prototype, and no field shakedown tests were conducted before the tests described here. During the course of the test seasons many defects in the Snowblast were noted. Two major breakdowns occurred in the power train consisting of bearing failures in the transfer gear box. The first breakdown occurred after 48 hours of plowing; after the necessary repairs were made the unit operated another 2 hours before the same failure occurred, thus ending any further testing in Greenland. The plow was then returned to Houghton, Michigan where repairs and modifications were performed. These included repair of the power train, provision for a slower track speed, and increasing the horsepower of the plow engine. The machine was operated for an additional 20 hours after modification. It was found that the modifications had corrected many of the original deficiencies in the machine. However, although the rotary unit itself is effective in milling and moving snow, additional modifications would have to be made to make the Snowblast operationally satisfactory on the Greenland Ice Cap. (Author)

PB-167 112 Field 13B, 6C
CFSTI Prices: HC$2.00 MF$0.50

Commissariat a l'Energie Atomique, Pierrelatte (France). Centre de Pierrelatte.
DIAGNOSIS OF WATER POLLUTION CAUSED BY CHEMICAL EFFLUENTS USING HYDROBIOLOGICAL METHODS (Diagnostic de la Pollution des Eaux par les Effluents Chimiques au Moyen des Methodes Hydrobiologiques),
by Claude Simeon and Jean Bonnefoy-Claudet.
Apr 65, 46p CEA-R-2751
Unclassified report

Text in French; Attached Summary in English.

Descriptors: (*Wastes (Industrial), Water pollution), (*Water pollution, Analysis), (*Ecology, Water pollution), Chemicals, Toxicity, Aquatic animals, Fishes, Plankton, Algae, Life cycle, Rivers, Sewage, Disposal, France.

Industrial plants which discharge chemical effluents into rivers are faced with a double problem. (1) To avoid excessive pollution which leads to an important modification of the medium and to a poisoning of the aquatic fauna, and in particular to the killing of fish. These disadvantages are avoided by a treatment of the effluents, by calculating the minimum fatal doses and the limiting dilutions for fish, and by carrying out biological analyses and tests on the residual waters. (2) To avoid provoking continuous, slow and insiduous pollutions which are more difficult to detect and which would result in the gradual sterilization of receptive media. In order to estimate this possible influence, a list was made of the aquatic fauna and flora found in the canal which was the object of the experiment, and a modification was made of the Saprobies system due to Kolwickz. An attempt was made to detect the presence or absence of pollution by estimating the density of the phyto-plankton formed on submerged laminae (periphyton) and the specific variations in the alga of which these populations are made up. Details are given of the tests and of the first results obtained. (Author)

PB-167 372 Field 13D, 11I, 14B
CFSTI Prices: HC$3.00 MF$0.75

Picatinny Arsenal, Dover, N. J.
VIBRATION TESTING OF RESILIENT PACKAGE CUSHIONING MATERIALS,
by George Zell. Aug 64, 73p
Technical rept. no. TR-3160
Proj. 1A024401A110
AD 444 825 Unclassified report

Descriptors: (*Packing materials, Expanded plastics), (*Vibration insulators, Packing), (*Expanded plastics, Packaging), (*Packaging, Expanded plastics), Styrene plastics, Isocyanate plastics, Vibration, Impact shock, Test methods, Test equipment, Standardization.

Performance criteria for cushioning materials and tentative test methods have been evolved through coordination with an ASTM task group from government and industry. Testing equipment which meets tentative ASTM requirements has been developed. Preliminary tests have been conducted on a resilient expanded polystyrene foam (in 3 densities) and a polyether urethane foam (in one density). When vibrated under static loads known to provide optimum shock mitigation (0.6 to 1.5 psi) the polystyrene foam experienced pronounced permanent set (up to 36% of original thickness) after partial completion of the vibration transmissibility test schedule. The set induced in similar new cushions by vibration generally exceeded the set induced (under the same static loads) by 5 successive 36-inch free-fall impacts. The 5-impact sequence gave the vibrated polystyrene cushions permanent sets up to 78%. Transmitted accelerations were up to 220% of those for unvibrated cushions.

PB-167 407 Field 13M, 01C, 11D, 11F, 16D
CFSTI Prices: HC$3.00

RAND Corp., Santa Monica, Calif.
FIBERED MATERIALS FOR FLIGHT STRUCTURES,
by George A. Hoffman. 18 Feb 57, 63p
Rept. no. RM-1868
AD 123 538

Unclassified report

Rept. on Proj. RAND.
Available copy will not permit fully legible reproduction.

Descriptors: (*Fibers, Structural parts), (*Structural parts, Tensile properties), Ceramic materials, Textiles, Graphite, Carbides, Cables (Mechanical), Rods, Aircraft, Guided missiles, Pressure vessels, Filaments, Fiber metallurgy, Single crystals.

An evaluation is made of the possible use of high-strength fibers in tension structural elements. The known properties of fibers, especially those whose strength is close to that of atomic bonds ('whiskers'), are reviewed, and various techniques by which such fibers may be produced are discussed. The conclusion is drawn that no major obstacles have been uncovered which would prevent the use of fibers to improve present-day structural materials used in tension elements. The evaluation proceeds on the hypothesis that fibered materials can be produced with strengths well above those of the massive forms of the material.

PB-167 419 Field 13K, 22B
CFSTI Prices: HC$5.00 MF$1.00

Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.
ULTRA-HIGH VACUUM VALVE STUDY.
Rept. for 21 May 62-15 Dec 63,
by T. S. James, G. J. Reiling, and J. C. Murphy.
Jul 64, 165p Rept. no. PDM12077A
Contract AF40 600 991, Proj. 7778, Task 777801
AEDC TDR-64-164; AD 443 034

Unclassified report

Descriptors: (*High-vacuum valves, Design), Vacuum seals, Gate valves, Space environmental conditions, Test equipment, Gaskets, Metal seals, Gas flow, Temperature, Tests, Gas leaks, Manufacturing methods, Elastomers, Rubber seals, Effectiveness.

A study was undertaken to develop a 48-inch diameter ultra-high vacuum valve for use in the diffusion pumping system of a large space environmental chamber. To make a choice for the main seal a literature search was made and various types of seals were analyzed, leading to the selection of several seals for testing. Mechanical and vacuum tests performed on seal test plates resulted in the development of a knife edge-lead groove seal which was leak-free under ultra-high vacuum conditions. Several valve concepts were developed and two were chosen for design. One, a swing gate straight through valve, was fabricated as a prototype and tested under actual operating conditions. The tests indicated that the prototype valve is capable of sealing a pressure of 1 x 10 to the minus 9th power mm Hg against full atmospheric pressure, with minimum leak rates lower than 7.32 x 10 to the minus 11th power atm-cc/sec. Fifty open-close operations did not adversely affect the functioning of the valve. (Author)

PB-167 430 Field 13I, 11F
CFSTI Prices: HC$2.00 MF$0.50

Battelle Memorial Inst., Columbus, Ohio.
RESEARCH ON HYDROGEN EMBRITTLEMENT OF STEEL SPRINGS.
Quarterly rept. no. 3, 1 Jan-1 Apr 55,
by J. A. Gurklis, L. D. McGraw, F. H. Lyon, and C. L. Faust. 1 Apr 55, 28p
Contract DA36 039sc63225, Projs. 3 93 00 500, 2005A
AD 73 169

Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Springs, Steel), (*Steel, Hydrogen embrittlement), (*Hydrogen embrittlement, Steel), Fatigue (Mechanics), Ductility, Eectroplating, Cadmium, Heat treatment, Plating.

Fatigue strength and relative ductility for as-received, electroprocessed, plated, and heat-treated spring-steel material were determined. The fatigue tests were carried out using an electromagnetic testing unit. Ductility was measured by means of bend tests. Cadmium plating the spring steel reduced the endurance limit about 15-20 per cent as compared with as-received material. Ductility was also reduced by cadmium plating. Baking the cadmium-plated spring steel at the conventional temperature of 375 F for 4 and 24 hours failed to raise the endurance. The ductility of the cadmium-plated spring syrrteel was not improved by heat treating at 375 F for 4 and 24 hours, nor by heat treating at 525 F for from 2 to 5 hours. (Author)

PB-167 433 Field 13H, 09E
CFSTI Prices: HC$4.00 MF$1.00

Autonetics, Downey, Calif.
METHODS OF TESTING ELECTROMECHANICAL COMPONENT PARTS,
by Elroy L. Roth. 30 Sep 57, 150p
Rept. no. EM-1362
Contract AF33 600 28469
AD 218 983

Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Engines and motors, Test methods), Reliability, Reliability (Electronics), Standardization, Quality control, Servomotors, Aircraft, Design, Relays, Electrical equipment, Malfunctions, Machines.

This report describes test procedures found to be most successful in separating reliable electromechanical parts from those of substandard accuracy and reliability. One of the best methods of increasing the overall reliability in a complex electromechanical system is the use of reliable component parts operated well within their limitations. To assure reliable component parts, adequate purchase specifications (based on preliminary tests), qualification and quality verification testing to these specifications, and the purchase of only qualified parts backed by inspections tests on each shipment, are necessary. The most successful test procedures of Autonetics are described.

PB-167 461 Field 13H, 11F
CFSTI Prices: HC$1.00 MF$0.50

Frankford Arsenal, Philadelphia, Pa. Research and Development Directorate.
MANUFACTURE OF URANIUM-8.5% MOLYBDENUM BALLS,
by R. V. London and R. E. Edelman. Jul 64, 15p Technical memo. M65-3-1
Proj. 5B96 10 001 Unclassified report
AD 448 999

Descriptors: (*Material forming, Spheres), (*Uranium alloys, Material forming), Molybdenum alloys, Casting, Forging, Rolling (Metallurgy), Heat treatment, Manufacturing methods, Wire, Precision finishing, Cold working.

In an effort to meet increasing demands by the army for components fabricated from dense materials (such as an 0.20 in. diameter ball weighing 20 ± 1 gr), a study was made to find suitable material and methods of processing. Of the two materials (uranium- and tungsten-based alloys) having the necessary density, an uranium-8.5% molybdenum alloy was chosen because of its combination of strength and ductility. The problem of fabricating a smooth wire, free from kinks and surface imperfections, was undertaken at Frankford Arsenal, and the various phases of the process - casting, heat treating, forging, rolling, annealing, swaging, and testing - are described. A feasibility study to determine techniques for manufacturing production quantities of uranium balls was undertaken by the contractor, using the cold heading technique and then grinding the rough balls to size, using standard production equipment. The methods of pressing the material, rill filing, and tumbling are described in the Appendix. (Author)

PB-167 478 Field 13H
CFSTI Prices: HC$7.00 MF$1.50

Battelle Memorial Inst., Columbus, Ohio.
SURVEY OF CURRENT KNOWLEDGE OF METAL DEFORMATION PROCESSING AND DEFORMATION CHARACTERISTICS OF BERYLLIUM, REFRACTORY METALS, SUPERALLOYS, AND HIGH-STRENGTH STEELS, AND OTHER DIFFICULT-TO-FORM METALS.
Final technical rept. for 13 May 63-13 Jun 64,
by F. W. Boulger, D. E. Strohecker, A. M. Sabroff, J. A. Houck, and H. R. Ogden. 14 Aug 64, 303p
Contract N600 19 60240
AD 446 229
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Material forming, Metals), (*Deformation, Metals), (*Metals, Processing), (*Beryllium, Deformation), (*Refractory metals, Deformation), (*Steel, Deformation), Alloys, Extrusion, Lubrication, Forging, Rolling (Metallurgy), Anisotropy, Strain (Mechanics), Mechanical properties, Reviews.

A survey was conducted to collect information on deformation characteristics of metals and their effect on processing operations. The objective was to help the nonspecialist in recognizing the implications of scientific findings and in applying them in specific operations. In order to be useful for engineering students and production engineers the topics are treated in two ways. Generalized discussions of common processes point out why specific variables must be modified in order on the more-difficult-to-form metals are used to illustrate the principles, limitations, and effects of the processes. Research in metalworking advances the understanding of processing operations and reduces the gap between theoretical and practical experience. Therefore, some of the sections cover particular reactions and properties which are affected by deformation history. Although of more fundamental interest, that information may be helpful in designing and exploiting new fabrication techniques. (Author)

PB-167 484 Field 13C, 13A, 17I
CFSTI Prices: HC$2.00 MF$0.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
UNDERSNOW STRUCTURES: N-34 RADAR STATION, GREENLAND,
by Malcolm Mellor. Aug 64, 34p
Technical rept. no. TR-132
Task 8S66 02 001 02
AD 445 872
Unclassified report

Descriptors: (*Radar stations, Greenland), (*Snow, Underground structures), Prefabricated buildings, Steel, Pipes, Structural shells, Heat transfer, Deformation, Loading (Mechanics).

Data previously obtained in a program of instrumentation and observation to appraise the performance of radar station N-34 built at an altitude of about 7000 ft in the dry-snow zone of the Greenland Ice Cap are condensed and presented. N-34 consisted of prefabricated buildings erected inside tubular corrugated-steel shells and the whole complex was interconnected with a closed network of steel tubes. The snow cover accumulation on the abandoned station, from 1957 to 1963, of more than 20 ft is still being restrained by the structural shells. Observations of long-term effects on this unique structure are utilized to analyze new and existing data in evaluating design concepts. Structural deformation, differential settlement, and heat loss are discussed, and some remarks relevant to future design are made. (Author)

RFP-480 Field 13I
CFSTI Prices: HC$0.50 MF$0.50

Rocky Flats Div., Dow Chemical Co., Golden, Colo.
THE ALPHA ANGLE ADJUSTER,
by A. S. Kaminski, J. H. Maytag, and D. J. McPhee.
3 Feb 65, 11p
Contract AT(29-1)-1106
Unclassified report

Descriptors: (*Transducers, Positioning devices (Machinery)), (*Positioning devices (Machinery), Transducers).

SB-543 Field 13I, 09B

Clearinghouse for Federal Scientific and Technical Information, Springfield, Va.
NUMERICAL CONTROLLED TOOL SYSTEMS.

Price list, selective bibliography of Government research repts. and translations through Mar 65.
Mar 65, 8p Unclassified report

Available free from the Clearinghouse.

Descriptors: (*Machine tools, Control systems), (*Bibliographies, Machine tools), (*Cutting tools, Control systems), Automatic, Programming (Computers), Drilling machines, Milling machines, Numbers, Dies, Computers.

Lists 75 references on numerical controlled tool systems added to the CFSTI collection through March 1965. Includes research on automatically programmed tools (APT); numerically controlled machine tools, milling machines, machining of forging dies, shipyard fabricating equipment and metal cutting machine tools; ADAPT system (automatic programming system for numerically controlled machine tools); and mechanization and automation in machine building. (Author)

14. Methods and Equipment

AD-417 248 Field 14C, 09B, 11D
CFSTI Price: HC$3.00

General Electric Co., Bridgeport, Conn.
REINFORCED PLASTIC MAGNETIC TAPE.
Quarterly rept. no. 1, 1 Apr-30 Jun 63,
by N. Kirk, D. McBournie, and L. Udani. 30 Jun 63, 55p
Contract DA36 039AMC02203E, Proj. 3A99 15 003
Unclassified report

Descriptors: (*Magnetic tape, Composite materials), (*Magnetic recording systems, Magnetic tape), Data storage systems, Plastic coatings, Glass textiles, Reinforcing materials, Tensile properties, Reliability, Feasibility studies, Manufacturing methods.

Magnetic tapes possess inadequacies for certain critical data storage applications. The objective of this project is to determine the feasibility of developing complete tapes which will improve the efficiency and reliability of automatic data processing equipment and astroelectronic recording devices. Significant improvement was achieved in the tear and crease resistance of Lexan(R)-impregnated glass cloth tape base.

AD-435 024 Field 14B, 09B
CFSTI Price: HC$6.00

Air Force Flight Test Center, Edwards AFB, Calif.
AFFTC TEST FACILITIES HANDBOOK.
1964, 288p Rept. no. FTC-T1H-63-2003
Unclassified report

Descriptors: (*Flight testing, Air Force), (*Handbooks, Test facilities), (*Test facilities, Air force research), Research program administration, Test equipment, Instrumentation, Ground support equipment, Guided missile tracking systems, Data processing systems, Operations research, Manned spacecraft, Tracking cameras.

An authoritative and convenient source of information is presented concerning the Air Force Flight Test Center, its mission and support capabilities, and the procedures by which these are provided. A comprehensive summary of Center capabilities is included. AFFTC's origin, mission, concept of operations, general policies, and official relationships and conditions that govern or apply at the Center are set forth. AFFTC's technical and support services are summarized. (Author)

AD-441 303 Field 14B
CFSTI Price: HC$1.00

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
KNIFE-EDGE CONTROLLER FOR A SCHLIEREN SYSTEM,
by C. B. Wells. Jun 64, 23p
Rept. no. AEDC TDR-64-126
Contract AF40 600 1000, Proj. VT8002
Unclassified report

Descriptors: (*Supersonic wind tunnels, Optical equipment), (*Optical equipment, Control systems), (*Control systems, Optical equipment), Vibration, Servomechanisms, Optical analysis, Light transmission, Monitors, Transistors, Diodes (Semiconductors), Power supplies, Servo amplifiers, Transistor amplifiers, Direct current, Photoelectric cells (Semiconductor).

A device has been developed to alleviate the effects of vibration induced into the schlieren system of a 40-in. supersonic tunnel. The merits of using a closed-loop servo system, for knife-edge contol, to compensate for vibrations in a schlieren system are demonstrated. Included is a discussion of the schlieren system optics which compares the monitor light to the schlieren light path and illustrates the purpose of a monitor light source for control purposes. A brief explanation is given of the servo system and the method by which it positions the knife edge in response to the changes in light as sensed by a detector. (Author)

CAPE-615 Field 14B

Oak Ridge National Lab., Tenn.
METAL IDENTIFICATION METER.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Metals, Identification), (*Permeameters, Mechanical drawings), Alloys, Conductivity, Permeability (Magnetic), Thickness, Nickel alloys, Stainless steel, Electric currents, Portable, Transistors, Circuits, Meters.

Five drawings are included. The extremely stable eddy-current instrument is used to sort metals and alloys on the basis of conductivity and permeability. It will positively identify Inconel parts in the presence of both the austenitic stainless steels and the Hastelloy, and it will identify a metal or alloy in any system of nonferromatic materials in which the conductivity of the metal is unique. It also is used to measure the thickness of thin metal sections. A battery power supply is used with the portable instrument. A circuit revision is included that reflects a change of some of the p-n-p type transistors to an n-p-n type. (P. C. H.) (AEC Abstract)

CAPE-849 Field 14E

Los Alamos Scientific Lab., N. Mex.
FRAMING CAMERA, MODEL X-9.
Engineering materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Rotating-mirror cameras, Mechanical drawings), Camera shutters.

Eleven drawings are included. The continuous writing, framing camera (10 in. EF/20) has a rotating mirror of three faces to form a prismatic unit with an equilateral triangle cross section. The H-17 steel mirror is 3.356 in. at the base, 2.906 in. high, and 2 in. deep. Both fast and slow speed shutters are included. (AEC abstract)

CAPE-1149 Field 14B

Union Carbide Nuclear Co., Oak Ridge, Tenn. Y-12 Plant.
FILTER INSTALLATION STANDARD.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Gas filters, Mechanical drawings), (*Structural parts, Gas filters), Standardization, Air, Maintenance, Design, Installation.

One drawing is included. The welded, angle iron filter frame is used with chemical warfare, high efficiency particulate air filters. The filters are 24 x 24 x 11 1/2 in. These are supported, positioned, and held in the frame by heavy stud bolts, which make it easy to service the filters. (AEC abstract)

CAPE-1164 Field 14B

Du Pont de Nemours (E. I.) and Co., Inc., Aiken, S. C. Savannah River Lab.
METALLOGRAPHY EXAMINATION AND PREPARATION FACILITY, HIGH LEVEL CAVES.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Test facilities, Metallography), (*Metallography, Test facilities), Preparation, Positioning devices (Machinery), Remote control systems, Radioactivity, Mechanical drawings.

Twenty-three drawings are included. The remote Metallography Facility is capable of preparing and examining 200 high quality specimens per month. The facility is installed in five general-purpose hot cells. Each major preparation step is performed in a separate cell: cutting, mounting and grinding, polishing, etching, and examination. Each cell is equipped with a pair of Model 8 master-slave manipulators. All equipment is designed on a modular basis to permit flexibility in arranging the equipment for maximum utilization. (AEC Abstract)

N65-19278 Field 14B
CFSTI Prices: HC$3.00 MF$0.50

National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
DESCRIPTION AND INITIAL CALIBRATION OF THE LANGLEY 12-INCH HYPERSONIC CERAMIC-HEATED TUNNEL,
by Louis E. Clark. Mar 65, 54p
NASA-TN-D-2703
Unclassified report

Descriptors: (*Hypersonic wind tunnels, Jets), (*Heat exchangers, Hypersonic wind tunnels).

Patent 3,174,342 Field 14B

RESISTANCE TEMPERATURE DETECTOR.
Patent assigned to Air Force,
by Frank D. Werner and Robert E. Keppel. 23 Mar 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Resistance thermometers, Specifications), Gas flow, Temperature, Measurement, Coils, Platinum, Wire, Hermetic seals, Patents.

The resistance temperature detector is for high speed gas temperature measurement. The resistance element is a 2-mil platinum wire wound in a bifilar relationship around a thin-walled, platinum housing defining one of three concentric chambers. The device has an improved attachment to lead-in conductors. It is suitable for use with a sonic orifice for total temperature measurement at high subsonic or supersonic speeds.

PB-167 341 Field 14B, 08C, 08J
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
HYDROGRAPHIC SIGNAL BUILDING,
by Ray M. Sundean. 1964, 8p
Unclassified report

Descriptors: (*Oceanographic equipment, Signals), Construction, Colors, Structures.

PB-167 394 Field 14C, 11I
CFSTI Prices: HC$2.00 MF$0.50

General Electric Co., Bridgeport, Conn.
REINFORCED PLASTIC MAGNETIC TAPE.
Quarterly rept. no. 2, 1 Jul-30 Sep 63,
by N. Kirk, D. McBournie, and L. Udani. 30 Sep 63, 36p
Contract DA36 039AMC02203E, Proj. 3A99 15 003
AD 425 177
Unclassified report

Descriptors: (*Magnetic tape, Plastics), (*Plastics, Magnetic tape), Polymers, Reinforcing materials, Fibers, Oxides, Data processing systems, Impregnation, Adhesion, Composite materials, Binders, Bonding, Esters, Solvents, Carbonates, Silicone plastics, Organic materials, Manufacturing methods, Glass textiles, Tensile properties, Coatings, Films, Processing.

The project is to determine the feasibility of developing a composite magnetic recording tape characterized by strong, stable backing materials and superior bonding of magnetic oxide to the base, a composite which will overcome some of the present-day inefficiencies of magnetic tapes for certain critical data storage applications. Encouraging results were obtained with both film transfer and solvent coating of oxide dispersions. The film transfer bonds better but is difficult to control. The continuous pilot plant for producing the reinforced base is undergoing start-up tests. (Author)

PB-167 408 Field 14B
CFSTI Prices: HC$6.00 MF$1.25

Aerospace Corp., Los Angeles, Calif.
HYPERSONIC WIND TUNNEL FACILITIES IN THE UNITED STATES,

by F. A. Vicente and Nancy S. Foy. Mar 63, 213p
Rept. no. TOR-169(3305)-1
Contract AF04 695 169
AD 405 493

Unclassified report

Descriptors: (*Hypersonic wind tunnels, United States), Test facilities, Hypersonic characteristics, Reynolds number, High altitude, Superaerodynamics, Indexes.

The report presents a compilation of hypersonic wind tunnel facility data, with particular attention given to operating characteristics of the major hypersonic wind tunnels in the United States. The information has been compiled to assist personnel who must evaluate and select facilities for hypersonic wind tunnel test programs. A brief description is given for each facility. These descriptions include information regarding responsible personnel; nozzle and test section; instrumentation; operational status, where such information is pertinent; data reduction method, whenever this has been available; running times; and particular test capabilities of each facility. An envelope of Reynolds number versus Mach number was drawn for each facility, using a uniform scale. Since envelopes of stagnation conditions were available in most cases, these also have been drawn on a uniform scale. In these graphs Mach number and Reynolds number represent free stream conditions, and stagnation pressure, temperature and enthalpy refer to conditions in the stagnation region of the model, except for the few cases where reservoir conditions are specified.

PB-167 412 Field 14C, 11D
CFSTI Prices: HC$2.00 MF$0.50

General Electric Co., Bridgeport, Conn.
REINFORCED PLASTIC MAGNETIC TAPE.
Quarterly rept. no. 3, 1 Oct-31 Dec 63,
by N. Kirk, D. McBournie, and L. Udani.
31 Dec 63, 36p
Contract DA36 039AMC02203E, Proj. 3A99 15 003
AD 435 763

Unclassified report

Descriptors: (*Magnetic tape, Composite materials), (*Plastics, Reinforcing materials), Glass textiles, Textiles, Iron compounds, Oxides, Coatings, Magnetic properties, Physical properties.

Magnetic tapes posses inadequacies for certain critical data storage applications. The objective of this project is to determine the feasibility of developing complete tapes which will improve the efficiency and reliability of automatic data processing equipment and astroelectronic recording devices. Glass reinforced tape base having generally improved physical and mechanical properties has been produced. Tear strength and surface smoothness have not yet been optimized. The continuous pilot line for making long tapes has been operated to produce 1000 ft. lengths of base. Minor changes in this equipment are expected to permit even better base quality, but high speed production by this process may prove difficult. A 900 ft. length of 3 in. reinforced base was precision coated with magnetic oxide by solvent casting.

PB-167 429 Field 14D, 09A
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
MONTE CARLO MODELS FOR ESTIMATING RELIABILITY: AN EXPLORATORY ANALYSIS,
by S. I. Firstman. 5 Jun 58, 38p
Rept. no. RM-2149
AD 213 036

Unclassified report

Rept. on Proj. RAND
Available copy will not permit fully legible reproduction.

Descriptors: (*Monte Carlo method), (*Reliability, Monte Carlo method), Reliability (Electronics), Failure (Mechanics), Analysis.

This memorandum presents an exploratory analysis of the problem of a priori reliability estimating by means of the Monte Carlo method. The method permits integrating into one analysis the effects on the system output of environmental and operational stresses, of time-dependent deterministic events, and of randomly occurring catastrophic events. The memorandum considers the problem of predicting non-catastrophic failures (other failure-causing effects can be superimposed upon the resultant model), and demonstrates the utility of the method, the validity of the results, the unbiased nature of derived estimates, and the requirements for input data. On the component level, any of several Monte Carlo models can, given both a priori knowledge of a system's operating environment and proper component test data, estimate the expected system performance and the consequent probability of successful operation. The extension of this technique to an analysis of system performance, when sub-system performance data are available, is also possible. To exhibit the use of a general model, the performance of a hypothetical component circuit is examined and an estimate of its reliability obtained. Further research of the type suggested will assist the development of a model that is capable of predicting non-catastrophic, performance-out-of-specification, failures.

15. Military Sciences

AD-407 909 Field 15C, 5D
CFSTI Price: HC$2.00

RAND Corp., Santa Monica, Calif.
THE ROLE OF CIVIL DEFENSE IN SOVIET STRATEGY,
by Leon Goure. Jun 63, 35p
Rept. no. RM-3703-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Civil defense systems, USSR), (*Military strategy, USSR), Attitudes, Political science, Defense systems.

Soviet interest in civil defense arises from a concept of war in which the opponent's morale and industrial capabilities are regarded as major targets for strategic attack. The purpose of such attack is to break the enemy's will to resist and to deprive him of the means of continuing the struggle by destroying his capacity to produce new weapons and military equipment. Although some Soviet military leaders believe that a general war may be a short one, they appear to have such confidence in the possibility of a long war as to prepare for it -- at least to the extent that their investment in civil defense contributes to this end. The Soviet civil defense program, which has been in effect for over a decade, has placed considerable stress on measures designed to protect industrial and administrative personnel, to ensure the continuity of industrial production under war conditions, and to reduce the shock and casualties among the population.

PB-167 386 Field 15E, 01C, 14D
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.

THE PREDICTION OF DEMAND FOR AIRCRAFT SPARE PARTS USING THE METHOD OF CONDITIONAL PROBABILITIES,
by J. W. T. Young, M. A. Geisler, and B. B. Brown.
17 Jan 55, 46p Rept. no. RM-1413
AD 86 702

Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Spare parts, Jet bombers), (*Stock level control, Spare parts), Inventory analysis, Probability, Binomials, Logistics, Procurement.

This is a methodological paper presenting a technique for predicting future demand (or consumption) of individual aircraft spare items on the basis of number of aircraft-months. Because such demand is subject to considerable variability, one can only state the probability with which a particular demand will occur. These probabilities can then be used in suitable logistics planning procedures to establish inventory levels, flyaway kits, procurement requirements, etc. Such planning procedures must be built around the uncertainty of demand rather than upon straight-line projection techniques often used. The prediction technique presented in this report is based on the method of conditional probabilities and the negative binomial distribution. It provides formulae for computing the probability that a demand of y units of an item will occur in a specified period, given that x units have been demanded in a certain past period. The report shows that the assumption underlying the negative binomial distribution appears to agree well with the observed past demand data from the validity tests employed. We also present a short example of how significant precise estimates of probability of demand can be in setting logistics policies.

PB-167 401 Field 15C
CFSTI Prices: HC$1.00 MF$0.0

RAND Corp., Santa Monica, Calif.
SOVIET CIVIL DEFENSE.
Revised ed.,
by Leon Goure. 14 Mar 60, 25p Rept. no. P-1887

AD 245 192

Unclassified report

Revision of rept. dated 19 Jan 60.
Available copy will not permit fully legible reproduction.

Descriptors: (*USSR, Civil defense systems), (*Civil defense systems, USSR), Shelters, Training.

Contents (Review of Soviet civil defense program based on publications):
Basic Soviet civil defense theory
Organization
Training
Means of protection
Individual measures
Collective measures (shelters): heavy detached shelters, detached shelters, Subways, basement shelters, field and emergency shelters, Shelter habitability
Evacuation
Pre-attack measures
Post-attack operations

SC-R-65-851 Field 15F, 18C, 11I
CFSTI Prices: HC$1.00 MF$0.50

Sandia Corp., Albuquerque, N. Mex.
PULSE STRENGTH OF HIGH POLYMERS,
by O. Milton, J. B. Allyn and L. J. Seligman. Jan 65, 21p CONF-695-3
Contract AT929-1)-789

Unclassified report

Presented at EIVR-10 Atomic Weapons Research Establishment Meeting, Aldermaston, Berks, Eng., Oct 64.

Descriptors: (*Nuclear weapons, Epoxy plastics), (*Epoxy plastics, Nuclear weapons).

16. Missile Technology

No entries

17. Navigation, Communications, Detection, and Countermeasures

AD-419 100 Field 17G, 01E, 08B
CFSTI Price: HC$5.00

Systems Research and Development Service, Federal Aviation Agency, Washington, D. C.
NAS CHART OVERLAYS FOR THE SYSTEM DESIGN TEAM.
Memorandum rept.,
by Harry L. Lamb. Jul 63, 200p
Proj. 150 3S

Unclassified report

Descriptors: (*Air traffic control systems, Maps), Operations research, Air traffic, Navigational aids, Communication systems, Radar stations, Search radar, Weather communications, United States.

This report presents reproductions of 20 of 35 overlays being made for the System Design Team to describe the Air Traffic Control System. In addition to the reproductions the report contains a descriptive background and data and sources from which the overlays are prepared. The original overlays consist of clear plastic mylar film upon which are plotted various aspects of the National Aviation System both present and planned. With these overlays which are based on the Aeronautical Planning Chart (AP9) one may visualize many parts of the system at one time in many combinations. (Author)

AD-419 179 Field 17J, 08K, 09B
CFSTI Price: HC$3.00

Melpar, Inc., Falls Church, Va.
ANALYSIS OF A MULTISENSOR SEISMIC ARRAY TECHNIQUE.
Final rept.,
by L. R. Linstrom. 31 Jul 63, 79p
Contract AF19 628 388, Proj. 8652, ARPA Order 292 62, Task 865207
AFCRL 63-894

Unclassified report

Rept. on Proj Vela Uniform
Available copy will not permit fully legible reproduction.

Descriptors: (*Seismographs, Instrumentation), Data processing systems, Seismic waves, Signal-to-noise ratio.

A study of the application of digital multibeam steering (DIMUS) to the outputs of seismometer arrays is described. Several other processing techniques were investigated with varying degrees of success. It is concluded that DIMUS offers a relatively inexpensive method for determining the arrival direction of seismic energy, but that it is not a good method for obtaining seismograms for visual analysis with currently available seismometer arrays.

Patent 3,176,523 Field 17G

TWO AXIS RATE GYRO.
Patent assigned to Navy,
by Thomas S. Amlie and Earl J. Donaldson. 6 Apr 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors:(*Guidance, Instrumentation), (*Gyroscopes, Design), Patents.

The gyro device is used to measure angular displacement for telemetering pitch and yaw information for guidance of guided missiles, aircraft and torpedoes. The two axis rate gyro produces both pitch and yaw rate signals through a single gimbal-less gyro. The gyro has a single rotor supporting shaft. It has a resonant frequency of suspension higher than the spin frequency in order to minimize 'cross talk.'

Patent 3,178,566 Field 17G, 1D, 9B

FUNCTION GENERATOR.
Patent assigned to Air Force,
by George F. Harpell. 13 Apr 65 Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Analog computers, Flight control systems), (*Flight control systems, Analog computers), Air traffic control systems, Radar tracking, Navigation computers, Patents.

The function generator is for use in an aircraft control system. The system includes the combination of an analog function generator and a radar system. The aircraft is picked up by the tracking radar, landing information is processed with the apparatus disclosed, and instructions derived from the apparatus are transmitted to the aircraft.

Patent 3,178,708 Field 17I, 9C

OPTO-ELECTRONIC PANEL DATA PROCESSOR.
Patent assigned to Navy,
by John H. Kuck. 13 Apr 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Doppler radar, Data processing systems), Range gating, Filters (Electromagnetic wave), Multiplex, Display systems, Electroluminescence, Photoelectric materials, Laminates, Electron optics, Radar tracking, Patents.

The opto-electronic panel data processor is used in a radar system. The system includes a four-layer panel made up of two layers of electroluminescent elements and two layers containing photoconductor elements, tuned receivers, synchronous switches, Doppler frequency generators, range pulse generators and an electroluminescent output display panel. The processor performs multichannel range gating and Doppler filtering operations.

PB-167 392 Field 17G
CFSTI Prices: HC$2.00 MF$0.50

Rome Air Development Center, Griffiss AFB, N. Y.
CATEGORY II/III TEST OF THE AN/GSN-5A,
by James R. Prichard. Apr 63, 34p
RADC TDR-63-166
AD 405 464 Unclassified report

Descriptors: (*Landing aids, Automatic navigators), (*Terminal flight facilities, Landing aids), (*Automatic navigators, Landing aids), Radar landing control, Automatic pilots, Ground-controlled approach radar, Data transmission systems, Flight testing, Flight control systems.

The Landing Control, Central, AN/GSN-5A is a ground-based, final approach navigation system providing three basic approach and landing techniques. These include completely automatic control, cross-pointer guided approach and talkdown. These techniques used singularly or in combination maintain aircraft surveillance and guidance information to touchdown. Test aircraft used in the Category II Program were an F-102A, KC-135, and an RB-57. In Category III test aircraft were an F-105, B-57, B-2, T-33, T-38, B-47, F-106, F-101, and an F-100. The F-102A was the primary automatic landing test vehicle. Test results are presented in the form of graphs, tables, and general comments and form a basis for the conclusions and recommendations. (Author)

PB-167 498 Field 17E, 20F
CFSTI Prices: HC$0.75 MF$0.50

Harry Diamond Labs., Washington, D. C.
A PROPOSED IR SCANNER OPTICAL SYSTEM,
by Donald Mary. 5 Nov 64, 20p
Rept. no. TR-1263
Projs. DA1P222901A207, 36100
AD 454 591; N65 16040
Unclassified report

Descriptors: (*Infrared scanning, Infrared optical systems), (*Infrared optical systems, Infrared scanning), Reflectors, Mirrors, Scanning, Design, Feasibility studies.

A long-wavelength infrared optical system having a 30-cm aperture and a focal ratio of 1 is described. Scanning of the field of view is accomplished by an oscillating plane mirror in front of the detector. An optical layout is used in which all optical surfaces are spherical and have common centers of curvature. (Author)

18. Nuclear Science and Technology

ANL-6902 Field 18J, 1A
CFSTI Prices: HC$2.00 MF$0.50

Argonne National Lab., Ill.

ENGINEERING DEVELOPMENT OF FLUID-BED FLUORIDE VOLATILITY PROCESSES. PART 6. PREPARATION OF DENSE URANIUM DIOXIDE PARTICLES FROM URANIUM HEXAFLUORIDE IN A FLUIDIZED BED,
by Irving E. Knudsen, Norman N. Levitz, and Albert A. Jonke. Dec 64, 31p Unclassified report
Contract W-31-109-ENG-38

Descriptors: (*Uranium compounds, Dioxides), (*Reactor fuels, Chemical engineering), (*Fluorides, Reactor fuels).

BMI-1696 Field 18G, 18J
CFSTI Prices: HC$2.00 MF$0.50

Battelle Memorial Inst., Columbus, Ohio.
THE MIGRATION OF GASEOUS AND SOLID FISSION PRODUCTS IN IRON-20 W/O CHROMIUM AND IRON-29 W/O NICKEL-13 W/O CHROMIUM,
by Arthur A. Bauer. 20 Oct 64, 41p EURAEC-1267
Contract W-7405-ENG-92
Unclassified report

Descriptors: (*Fission products, Reactor fuel cladding), (*Reactor fuel elements, Diffusion).

CEX-59.4.24 Field 18H, 8G
CFSTI Prices: HC$1.00 MF$0.50

Geological Survey, Washington, D. C.
AERORADIOACTIVITY SURVEY AND GEOLOGY OF THE GNOME (CARLSBAD) AREA, NEW MEXICO AND TEXAS (ARMS-I).
by Jules A. Mackallor. Feb 63, 30p
Contract AT-30-2-GEN-16 Unclassified report

Descriptors: (*Rock (Geology), Radioactivity), (*Radioactive fallout, Geology).

DLCS-36403 Field 18E, 18I
CFSTI Prices: HC$6.00 MF$1.00

Duquesne Light Co., Shippingport, Pa.
SHIPPING PORT OPERATIONS FROM POWER OPERATION AFTER SECOND REFUELING TO POWER OPERATION AFTER THIRD REFUELING, OCTOBER 24, 1961 - JANUARY 30, 1963.
1963, 268p Unclassified report

Descriptors: (*Nuclear power plants, Refueling), (*Refueling, Nuclear reactors).

GA-5554 Field 18K
CFSTI Prices: HC$4.00 MF$1.00

General Atomic, San Diego, Calif.
DIFFERENTIAL NEUTRON THERMALIZATION.
Annual summary rept. 1 Oct-30 Sep 64,
by W. L. Whittemore. 20 Oct 64, 113p
Contract AT(04-3)-167
Unclassified report

Descriptors: (*Thermal neutrons, Inelastic scattering), (*Thermal utilization, Neutron scattering).

HW-83614 Field 18G
CFSTI Prices: HC$2.00 MF$0.50

Hanford Atomic Products Operation, Richland, Wash.
PROGRESS IN STUDIES OF RADIONUCLIDES IN COLUMBIA RIVER SEDIMENTS. A SUMMARY OF HANFORD ACHIEVEMENTS IN THIS PROGRAM UNDER GENERAL ELECTRIC, 1963 - 1964,
by J. L. Nelson, R. W. Perkins, and J. M. Nielsen.
Dec 64, 26p
Contract AT(45-1)-1350
Unclassified report

Descriptors: (*Radioactive waste, Disposal), (*Sedimentation, Radioactivity), (*Fission products, Sedimentation).

IDO-17028 Field 18J
CFSTI Prices: HC$6.00 MF$1.50

Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
EXPERIMENTAL RESULTS OF POTENTIALLY DESTRUCTIVE REACTIVITY ADDITIONS TO AN OXIDE CORE.
ed. by J. E. Grund. Dec 64, 260p Unclassified report
Contract AT(10-1)-205

Descriptors: (*Critical assemblies, Test reactors), (*Reactor fuel rods, Rupture), (*Reactor cores, Reactor fuel rods).

IDO-17038 Field 18N, 21F
CFSTI Prices: HC$3.00 MF$0.75

Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
RADIOLOGICAL ASPECTS OF SNAPTRAN 2/10A-3 DESTRUCTIVE TEST,
by O. L. Cordes, R. P. Bird, G. A. Dinneen. Jan 65, 77p
AT(11-1)-205
Unclassified report

Descriptors: (*Nuclear propulsion, Reactor safety systems), (*Reactor cores, Radiation hazards), (*Fission products, Reactor cores).

IDO-17055 Field 18I, 18J
CFSTI Prices: HC$2.00 MF$10.50

Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
SPERT PROJECT.
Quarterly technical rept., Jul-Sep 64,
by J. G. Crocker ed. Jan 65, 46p
Contract AT(10-1)-205 Unclassified report

Descriptors: (*Nuclear reactors, Nuclear engineering), (*Reactor cores, Nuclear reactors).

LA-3174-MS Field 18J, 20M
CFSTI Prices: HC$2.00 MF$0.50

Los Alamos Scientific Lab., Univ. of California, N. Mex.
TRANSIENT TEMPERATURE ANALYSIS OF THE FUEL LOADER PUSH ROD AND GUIDE TUBE IN THE ULTRA HIGH TEMPERATURE REACTOR EXPERIMENT (UHTREX),
by C. H. Treat. Sep 64, 24p
Contract W-7405-ENG-36
Unclassified report

Descriptors: (*Reactor fuel elements, Reactor materials), (*Reactor fuel rods, Thermal radiation), (*Heat transfer coefficients, Thermodynamics).

LA-3186 Field 18K, 12A
CFSTI Prices: HC$3.00 MF$0.50

Los Alamos Scientific Lab., Univ. of California, N. Mex.
DISCRETE ORDINATES ANGULAR QUADRATURE OF THE NEUTRON TRANSPORT EQUATION,
by K. D. Lathrop and B. G. Carlson. 21 Sep 64, 48p
Contract W-7405-ENG-36
Unclassified report

Descriptors: (*Neutron transport theory, Nuclear reactors), (*Reactor theory, Integration), (*Nuclear moments, Geometry).

NAA-SR-10496 Field 18N, 21F
CFSTI Prices: HC$2.00 MF$0.50

Atomics International, Canoga Park, Calif.
PROGRESS REPORT FOR SNAP (SYSTEMS FOR NUCLEAR AUXILIARY POWER) GENERAL SUPPORTING TECHNOLOGY, AUGUST-OCTOBER 1964,
by L. S. Mims and R. G. Courson. 30 Jan 65, 7p
Contract AT-11-1-GEN-8
Unclassified report

Descriptors: (*Nuclear propulsion, Nuclear power plants), (*Nuclear power plants, Critical assemblies).

NAA-SR-10531 Field 18I, 18E
CFSTI Prices: HC$3.00 MF$0.75

Atomics International, Canoga Park, Calif.
MULTIGROUP CALCULATION METHODS WITH APPLICATION TO THE SGR CRITICAL EXPERIMENT,
by F. L. Fillmore. 1 Feb 65, 66p
Contract AT(11-1)-GEN-8
Unclassified report

Descriptors: (*Sodium graphite reactors, Reactor lattice parameters), (*Fast fission factor, Graphite moderated reactors).

NLCO-940 Field 18J
CFSTI Prices: HC$3.00 MF$0.50

National Lead Co. of Ohio, Cincinnati.
SUMMARY TECHNICAL REPORT FOR THE PERIOD OCTOBER 1, 1964 TO DECEMBER 31, 1964,
Ed. by R. Burgett. 10 Feb 65, 43p
Contract AT(30-1)-1156
Unclassified report

Descriptors: (*Reactor materials, Nuclear power plants), (*Reactor system components, Nuclear reactors), (*Reactor safety systems, Nuclear engineering).

Patent 3,177,482 Field 18D, 9B

SERVO-STABILIZED ANALOG-TO-DIGITAL CONVERTER FOR HIGH RESOLUTION PULSE ANALYSIS.
Patent assigned to AEC,
by Robert L. Chase. 6 Apr 65
Unclassified patent
Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Analog-to-digital converters, Stabilization systems), (*Pulse height analyzers, Analog-to-digital converters), Servomechanisms, Digital systems, Radiation measurement systems, Charged particles, Diodes (Semiconductor), Patents.

The system includes a detector for producing a signal in accordance with the particular energy of the particles being measured, preamplification and linear amplification stages, followed by an analog-to-digital converter where there is produced a string of pulses in number which reflect the amplitude of the detector signal and hence the energy of the particles striking the semi-conductor junction diode detector. The converter delivers its pulses to a digital storage system having the proper number of channels, in this case 4096 channels, where the information is accumulated and stored.

PB-167 355 Field 18K, 12A, 20H
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
A NEW APPROACH TO TRANSPORT THEORY,
by Bernard Shiffman. Jan 64, 37p
Rept. no. RM-3862-ARPA
ARPA Order 189 61
AD 429 086
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Neutron transport theory, Functional analysis), (*Integral equations, Neutron transport theory), Differential equations, Groups (Mathematics), Operators, (Mathematics), Matrix algebra.

A general viewpoint of one-dimensional, particle-transport processes is discussed; particle fluxes are considered abstractly as elements of a Benach space. The classical equations of transfer and the 'initial-value' equations of Bellman's invariant imbedding are given in terms of this abstract viewpoint. The specific integro-differential equations describing an energy-dependent, neutron-transport process are obtained from the abstract equations. A complete mathematical definition of an abstract linear transport process is given in terms of a new axiomatic system. After several preliminary theorems are proven, the basic algebraic equations relating the 'transport operators' are derived, and the semigroup properties of these equations are indicated. These algebraic equations are then used to derive the standard differential equations describing a transport process. A generalization of the 'Stokes relations' for homogeneous transport processes is also given. (Author)

PB-167 397 Field 18C, 17J
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
A METHOD OF CONCEALING UNDERGROUND NUCLEAR EXPLOSIONS,
by A. L. Latter, R. E. LeLevier, E. A. Martinelli, and W. G. McMillan. 30 Mar 59, 18p Rept. no. R-348
AD 230 099
Unclassified report

Declassified 20 Oct 59.
Available copy will not permit fully legible reproduction.

Descriptors: (*Underground explosions, Nuclear explosions), (*Nuclear explosions, Deception), (*Deception, Nuclear explosions), Effectiveness, Theory.

It is shown theoretically that nuclear explosions can be effectively hidden in large underground cavities. An estimate of the effectiveness of the method indicates that a yield of more than 300 KT could be made to look seismically like a yield of 1 KT. Experiments with both chemical and nuclear explosions are needed to test the theory. (Author)

PB-167 415 Field 18D
CFSTI Prices: HC$1.00 MF$0.50

Lockheed Aircraft Corp., Marietta, Ga.
A CURRENT INTEGRATOR FOR GAMMA DOSIMETRY,
by E. N. Lide and H. J. Jarvis. Mar 60, 20p
Nuclear rept. no. NR-81
Contract AF33 600 38947
AD 236 679

Unclassified report

Descriptors: (*Radiation measurement systems, Design), (*Gamma rays, Dosimeters), (*Dosimeters, Gamma rays), Integrators (Computers), Analog computers, Wiring diagrams, Calibration.

An analog computer (integrating device) was developed to compute the total radiation dose of a test article being irradiated. The circuit employs an electrometer tube connected as a cathode follower to drive an operations amplifier. A standard capacitor is connected from the electrometer input to the amplifier output. All of the current from an ionization chamber flows into the input capacitor; when the voltage across the capacitor reaches a predetermined value, the capacitor is automatically discharged and a count is entered into a mechanical register. Total dose may be read out in terms of counts in the register and fractions of a count from a built-in vacuum tube voltmeter circuit. (Author)

PB-167 427 Field 18D
CFSTI Prices: HC$3.00 MF$0.75

Air Force Weapons Lab., Kirtland AFB, N. Mex.
DOSIMETRY AND INSTRUMENTATION IN NUCLEAR RADIATION RESEARCH.
Survey for 1 Oct 63-1 Apr 64,
by Calvard S. Allen and Richard G. Hawkins.
Aug 64, 53p WL TDR-64-77
Proj. 6773
AD 447 319

Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Nuclear particles, Scientific research), Neutrons, Electrons, Fission products, Gamma rays, Alpha particles, Infrared detectors, Ultraviolet radiation, Bibliographies, Scintillation counters, Ionization chambers, Nucleons, Foils, Instrumentation, Radiation measurement systems, Dosimeters.

This report presents a brief general survey of current instrumentation in a variety of nuclear research fields. Selected items have been abstracted from leading journals and work efforts. A bibliography is presented with 150 selected articles. Recommendation for task efforts is included. (Author)

TID-3914 Field 18B
CFSTI Prices: HC$2.00 MF$0.50

Division of Technical Information Extension (AEC),
Oak Ridge, Tenn.
DIVISION OF ISOTOPES DEVELOPMENT AND CONTRACTOR PUBLICATIONS.
Nov 64, 31p

Unclassified report

Descriptors: (*Radioactive isotopes, Nuclear industrial applications), (*Isotope separation, Tracer studies).

19. Ordnance

AD-452 436 Field 19A
CFSTI Prices: HC$1.00

Harry Diamond Labs., Washington, D. C.
ELECTRONIC PROGRAMMER SYSTEM FOR XM471 PROJECTILE,
by O. T. Dellasanta and G. W. Kinzelman.
20 Jul 64, 37p Rept. no. TR-1242
Projs. 1C542603D421, 40500

Unclassified report

Descriptors: (*Time-delay fuzes, Timing circuits), (*Projectile fuzes, Timing devices), Magnetic cores, Electronic equipment, Safety, Safety devices, Arming devices, Feasibility studies, Proximity fuzes.

The programmer for the XM471 projectile is a gun-rugged, dual-channel, electronic timer. Each timer can be set to operate at any time between 8.0 and 79.9 sec in increments of 0.1 sec with an accuracy of ±0.1 sec. The timer is set with a single current pulse through a 27-pin connector located on the surface of the projectile. The programmer provides the following functions: (1) provides safety using electrical and mechanical environmental sensing devices, and an electronic safe-separation device; (2) provides the arming signals for the warhead and proximity fuze; (3) selects the proximity-fuze burst heights; (4) fires the warhead in the event the proximity fuze is not operating properly or if timer option is selected. Two timers and setback gates were fabricated. One timer was field tested. (Author)

PB-167 265 Field 19A, 07B, 07C
CFSTI Prices: HC$2.00 MF$0.50

Hercules Powder Co., Kenvil, N. J.
DEVELOPMENT OF HIGH TEMPERATURE RESISTANT PROPELLANTS.
Summary rept. no. 1,
by J. H. Godsey and W. P. Freese. Jun 63, 42p
Contract DA36 038 507ORD3572M, Proj. 1362, Task136205
FA R-1683; ASD TDR-62-1085

Unclassified report

Descriptors: (*Ammunition propellants, Solids), (*Propellant grains, Guns), (*Composite materials, Propellants), (*Organic compounds, Binders), Ammonium compounds, Potassium compounds, Perchlorates, Acrylic resins, Halogenated hydrocarbons, Silicone plastics, Extrusion, Solvents, Stability, Oxidizers, Synthetic rubber, Antiaircraft ammunition, Projectiles, Heat-resistant plastics, Cartridges (PAD).

The object is to develop propellant compositions capable of reliable performance after withstanding -65F to +400F soak temperature for a minimum of 4 hours. These propellants must be capable of being processed by commercially-feasible techniques into gun-type grains. The object should be directed toward meeting the performance requirements of the M-73 Propellant Actuated Device (PAD) cartridge. Processes have been developed for solvent-extrusion of several thermally-stable composite propellant types. These include compositions with polyacrilic, fluorocarbon, and silicone rubber binders, in combination with ammonium perchlorate (AP), potassium perchlorate (KP), or diaminotrinitrobenzene (DATB). Thermal stability of the various oxidizer-bindercombinations has been characterized at temperatures of 400F and higher in oven and autoignition tests. Attempts to extrude and granulate propellants with triallyl cyanurate (TAC)-diallyl phthalate

(DAP) binder were unsuccessful due to poor strength of this combination. Propellants were successfully manufactured by substituting Hycar 4021 for the DAP, but these were not cross-linked, presumably due to insufficient reactivity of the rubber.

PB-167 333 Field 19D
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
OPERATION PLOWSHARE, PROJECT SCOOTER: SURFACE MOTION FROM A CRATERING SHOT IN DESERT ALLUVIUM,
by Wendell V. Mickey. 8 Sep 61, 28p
Contract AT29 2 746
Unclassified report

Descriptors: (*Soil mechanics, Cratering), (*Cratering, Deserts), (*High-explosive ammunition, Cratering), Underground explosions, Nevada.

A one million pound high-explosive tampled shot in desert alluvium produced transient displacements on the alluvial fill out to 14,000 feet which were about four times larger than comparable shots in tuff with the detector on bedrock. The accelerations were from 5 go 8 times aslarge as the predicted values but with a systematic convergence to the scaling curve with increasing distance. Maximum displacements were in the surface wave group. Stations on bedrock recorded displacements very close to predicted values. (Author)

20. Physics

AD-412 800 Field 20C, 01A, 20D
CFSTI Price: HC$2.00

Mathematics Research Center, Univ. of Wisconsin, Madison.
ON THE KUTTA-JOUKOWSKI CONDITION IN THE MAGNETO-FLUID DYNAMICS,
by K. Stewartson. Jun 63, 45p
Technical summary rept. no. MRC-TSR-399
Contract DA11 022ORD2059
N63 19013
Unclassified report

Descriptors: (*Magnetohydrodynamics, Aerodynamic characteristics), Fluid mechanics, Fluid flow, Lift, Differential equations, Wake.

AD-431 102 Field 20E
CFSTI Price: HC$2.00

Lear Siegler, Inc., Santa Monica, Calif.
SATURABLE FILTER INVESTIGATION.
Semiannual technical rept. for 1 Jul-31 Dec 63,
by T. E. Stark, L. A. Cross, and J. L. Hobart.
19 Feb 64, 29p
Contract Nonr412500, Proj. NR015 702;
ARPA Order 306 62
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Lasers, Filters (Electromagnetic waves), Materials, Photons, Fluorescence, Decay schemes, Polarization, Attenuation, Glass, Uranyl radicals, Xenon lamps, Absorption, Impurities, Chromium, Emissivity.

The results are presented of the search for suitable saturable filter materials and the theoretical investigation of the saturation effect. The observation of saturation effects in uranyl glass filters is discussed. The effect of a saturable filter in the laser cavity is demonstrated with an experimental Q-switched laser. (Author)

AD-431 523 Field 20D, 09B, 12A
CFSTI Price: HC$1.00

RAND Corp., Santa Monica, Calif.
ON COMPUTATIONAL APPROACHES TO SOME MATHEMATICAL MODELS OF TURBULENCE,
by S. P. Azen, R. Bellman, and J. M. Richardson.
Jan 64, 22p Rept. no. RM-3819-ARPA
Contract SD79, ARPA Order 189 61
N64 16652
Available copy will not permit fully legible reproduction.

Descriptors: (*Turbulence, Mathematical models), (*Mathematical models, Turbulence), Programming (Computers), Differential equations, Partial differential equations.

The nonlinearity of the equations of turbulence forces the mathematician to study approximation techniques, such as 'model equations' which exhibit many of the characteristics of the realistic equations. Computational methods to the solution of the model equation of Burgers are investigated. The application of a classical method of converting a partial differential equation into an infinite system of ordinary differential equations is studied. Numerical results obtained from a FORTRAN program are given. (Author)

AD-441 779 Field 20K, 13J
CFSTI Price: HC$1.00

David Taylor Model Basin, Washington, D. C.
GRAPHICAL ANALYSIS FOR MAXIMUM STRESSES IN SANDWICH CYLINDERS UNDER EXTERNAL UNIFORM PRESSURE,
by James A. Nott. May 64, 25p Rept. no. 1817
Proj. S F013 03 02 Unclassified report
Available copy will not permit fully legible reproduction.

Descriptors: (*Cylindrical bodies, Sandwich construction), (*Stresses, Mathematical analysis), Graphics, Transcendental functions, Submarine hulls, Structural shells, Hydrostatic pressure, Stiffened cylinders.

A simplified solution is presented for computing the axial and transverse forces in sandwich cylinders with annular webs loaded under external uniform pressure. A series of graphs is shown for the determination of Lame deflection coefficients and transcendental stress functions. With these forces and stress functions, a procedure is developed for computing maximum stresses in both outside and inside shells of the sandwich cylinders. Stresses can be computed more rapidly by this procedure than by a more exact solution. (Author)

AD-449 489 Field 20I, 20E
CFSTI Price: HC$5.00

Illinois Univ., Urbana. Engineering Experiment Station. Unclassified report

RESEARCH STUDIES OF HIGH-DENSITY PLASMAS.
Quarterly progress rept. no. 11, 15 Mar-15 Jun 64,
by J. Cahn, L. Dreyer, E. Bialecke, H. Merkelo,
and M. Sherman. 15 Jun 64, 173p
Contract DA36 039sc87232, Task 3A99-13-001-03
Unclassified report

Available copy will not permit fully legible reproduction.
See also AD-273 961.

Descriptors: (*Plasma medium, Physical properties), (*Lasers, Intensity), Plasma physics, Density, Light, Scattering, Resistance (Electrical), Temperature, Gas ionization, Hydrogen, Electrons, Kerr cells, Magnetic pinch, Atomic energy levels, Line spectrum, Probes (Electromagnetic).

Studies to increase the laser intensity were begun with efforts concentrated on cavity Q-spoiling techniques. Examples of increased laser output are presented. Also, preliminary theoretical considerations concerning coherence in plasma scattering are given. The resistance of a high-density plasma was measured and compared with resistances calculated from spectral temperature and density measurements. The effects of various forms of preionization on electron temperature were determined. A theoretical analysis of the expanding high-density plasma was made considering first expansion into a vacuum and then including the effects of the ambient plasma. A detailed consideration of the energy state of a high density gaseous plasma is included as a appendix. (Author)

BNL-897 Field 20H, 18K
CFSTI Prices: HC$3.00 MF$0.75

Brookhaven National Lab., Upton, N. Y.
ANALYSIS OF (N, 2N) CROSS SECTIONS FOR NUCLEI OF MASS A NOTLT 30.
by S. Pearlstein. Dec 64, 48p
BNL-T-365; EANDC(US)-71(U). Unclassified report
Contract AT-30-2-GEN-16

Descriptors: (*Neutron cross sections, Nuclear reactions), (*Nuclear properties, Neutron cross sections).

BNL-904 Field 20H
CFSTI Prices: HC$1.00 MF$0.50

Brookhaven National Lab., Upton, N. Y.
OPTICAL MODEL ANALYSIS OF THE NEUTRON-SODIUM CROSS SECTION IN THE 1-4 MEV RANGE.
Neutron Cross Section Evaluation Group Newsletter No. 8,
by T. J. Krieger and S. Pearlstein. Jan 65, 6p
BNL-N-8
Contract AT-30-2-GEN-16 Unclassified report

Descriptors: (*Neutron cross sections, Optical analysis), (*Sodium, Neutron cross sections).

OTR-118 Field 20F, 09A, 20E

National Bureau of Standards, Washington, D. C.
Inst. for Applied Technology.
FIBER OPTICS.
May 65, 20p Unclassified report

Prepared in cooperation with Clyde Williams and Co., Columbus, Ohio.
Available free from the Clearinghouse.

Descriptors: (*Fiber optics, Reviews), (*Reviews, Fiber optics), Reports, Abstracting, Light transmission, Lasers, Relaxation oscillators, Neuristors, Delay lines, Scanning, Computer logic.

Significant reports covering the period since 1959 were selected for this study with reference to relevant earlier works. Recent Government sponsored research has shown that, although the field of fiber optics is still in its infancy, some great strides ae being taken. Not only has advancement occurred in understanding of the theories involved, but some 'simple' experimental devices utilizing optical fibers have been produced. (Author)

PB-167 020 Field 20E
CFSTI Prices: HC$1.00 MF$0.50

Naval Research Lab., Washington, D. C.
LASER RESEARCH.
Interim progress rept. for period 1 Jan-30 Jun 64,
by J. W. Tucker and J. N. Bradford. 31 Jul 64, 22p
NRL-MR-1553
ARPA Order 306 62 Unclassified report
AD 445 026

Descriptors: (*Lasers, Scientific research), (*Ruby, Lasers), (*Spectrum analyzers, Prisms (Optics)), (*Flash lamps, Cryogenics), Excitation, Fluorescence, Single crystals, Optical properties, Impurities, Chromium.

Topics covered include ruby relaxation and fluorescent phenomena, a high-resolution spectrograph which repetitively scans and displays a narrow wavelength interval, a flash lamp operable at 77K, and evaluation of the optical quality of ruby. (Author)

PB-167 117 Field 20H, 18K
CFSTI Prices: HC$3.00 MF$0.75

Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
ANALYSIS OF RESONANCES DUE TO 'S' WAVE NEUTRONS IN TRANSMISSION TIME-OF-FLIGHT EXPERIMENTS. II. WITH AN INTERFERENCE TERM (Analyse des Resonances Dues aux Neutrons 's' dans les Experiences de Transmission par Temps de Vol. II. Avec Terme d'Interference),
by Charles R. Corge. Apr 65, 99p
CEA-R-2780 Unclassified report

Text in French; Attached Summary in English.

Descriptors: (*Nuclear resonance, Neutron scattering), (*Neutron scattering, Nuclear resonance), Resonance scattering, Potential scattering, Interference, Neutrons, Bessel functions.

Various methods of analysing resonances induced by 's' wave neutrons in transmission time of flight experiment are described in this report. This paper following the CEA-R report 1998 deals with the case when the interference between resonant and potential scattering is no more neglected. In the last section is described a method made of various ones gathered into a single program where one can find the partial areas method and also the so-called method of the width at depth f of the dip. (Author)

PB-167 169 Field 20M, 20F, 20J
CFSTI Prices: HC$3.00 MF$0.75

Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.

SOME PROPERTIES OF MATTER AT VERY HIGH TEMPERATURES AND HIGH PRESSURES (EQUATIONS OF STATE, OPACITY) (Quelques Proprietes de la Matiere aux Tres Hautes Temperatures et Fortes Pressions (Equation d'Etat, Opacite)).
Doctoral thesis,
by Andre Gervat. 1964, 94p CEA-R-2603
Unclassified report

Text in French; Attached Summary in English.

Descriptos: (*Equations of state, High-pressure research), (*High-pressure research, High-temperature research), (*High-temperature research, Wave transmission), (*Wave transmission, High-temperature research), Quantum mechanics, Statistical mechanics, Atomic energy levels, Energy, Density, Thermodynamics, Potential theory, Ionization.

The Thomas-Fermi equations which are zero-oder approximations of the Hartree-Fock equations, make it possible to study some aspects of the behaviour of matter at high pressues. In the first chapter is considered the calculation of values which do not require the Schroedinger equation to be solved. The values of the quantum and exchange corrections give the zone of validity of the theory. For each R and T pair it is possible to calculate the energy and the pressure. For the calculation of the energy it has been necessary, in the region close to the nucleus where the corrections diverge, to replace the density given by the Thomas-Fermi theory by that deduced from the wave-functions which, in the small region, are very similar to that of a hydrogen atom of charge z. The calculation of the degree of ionization is particularly simple and does not requie the SAHA equations to be solved. Besides the distribution of electrons in the r space it is simple to determine the distribution according to the quantum number 1, and this for each value of the R, T pair. (Author)

PB-167 193 Field 20F, 7D
CFSTI Prices: HC$1.00 MF$0.50

Air Force Cambridge Research Labs., Bedford, Mass.
CHARGE TRANSFER STUDIES WITH A TIME-OF-FLIGHT MASS SPECTROMETER: II. KINETIC ANALYSIS, INCLUDING ATTENUATION OF BOTH NEUTRALS AND IONS BY SCATTERING.
Physical Sciences Research Papers,
by W. W. Hunt, Jr. May 64, 15p
PSRP-16, AFCRL 64-383
Proj. 8605
AD 441 461; N64 22612
Unclassified report

Descriptors: (*Mass spectroscopy, Dynamics), (*Ions, Scattering), Electrostatics, Atoms, Molecules, Probability, Equations, Spectrum analyzers.

The kinetics of charge transfer processes that occur in the drift tube of a time-of-flight mass spectrometer are analyzed, with due regard to attenuation of both ions and neutrals by scattering. The same equation that expresses the charge transfer cross section in terms of experimentally measurable quantities (see AD-422 864) provides for independent determination, from the same experimental measurements, of the difference between the total scattering cross section for the neutrals and that for the ions involved in the charge transfer process being studied. A second, and much simpler, equation for the charge transfer cross section is used when the scattering cross sections for neutrals and ions are the same. Both equations allow for differences in detector response to neutrals compared with that to ions. (Author)

PB-167 325 Field 20K
CFSTI Prices: HC$3.00 MF$0.75

California Inst. of Tech., Pasadena.
THE STRESSES IN A SPHERICAL SHELL CONTAINING A CRACK,
by Efthymios S. Folias. Jan 64, 85p
Contract AF33 616 7806, Proj. 7063, Task 7063 02
ARL 64-23; AD 431 857
Unclassified report

Descriptors: (*Convex bodies, Stresses), (*Fracture (Mechanics), Curved profiles), Pressure, Sheets, Deformation, Integral equations, Spheres, Structures, Structural shells, Mathematical analysis.

The deformation of a thin sheet having initial spherical curvature is shown to be associated with that of an initially flat plate resting upon an elastic foundation. Using an integral formulation the coupled Reissner equations for a cracked shell of length 2c are solved for the in-plane and Kirchhoff bending stresses and, among other things, it is found that the explicit nature of the stresses near the crack point depends upon the inverse half power of the non-dimensional distance from the point epsilon. The character of the combined extension-bending stress field near the crack tip is investigated in detail for the special case of a radial crack in a spherical cap which is subjected to a uniform internal pressure and is clamped at the boundary. Pending a complete study of the solution, approximate results for the combined surface stresses near the crack tip normal and along the line of crack prolongation are given. The stresses along the crack prolongation were found to be equal. (Author)

PB-167 399 Field 20F
CFSTI Prices: HC$2.00 MF$0.50

David Sarnoff Research Center, Princeton, N. J.
INTERNAL FIELD ASSISTED PHOTOEMISSION RESEARCH.
Quarterly rept. no. 2, 1 Oct-31 Dec 60,
by A. H. Sommer, E. K. Gatchell, W. H. McCarroll, W. E. Spicer, and G. A. Morton. 31 Dec 60, 27p
Contract DA44 009eng4590
AD 253 039
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Photoelectric effect, Semiconductors), (*Semiconducting films, Photoelectric effect), Surface properties, Silver alloys, Antimony alloys, Potassium alloys, Barium alloys, Silicon alloys, Germanium, Silicon, Indium alloys, Cesium compounds, Iodides, Cesium alloys, Cathodes, Heat treatment, Epitaxial growth, Crystal structure, Intermetilic compounds.

Work was done on conventional and field induced photoemission. Under the first heading, experiments were made with thin films of the systems Ag-Sb-K, Ba-Si, and Ba-Sb. Work on field induced photoemission was pursued in the following directions: controlled method of Cs processing, surface films of CsI and Cs3Sb, n-type surface layers on Ge and Si produced by heat treatment and epitaxial growth and exploratory experiments with the small band gap semiconductor InSb. (Author)

PB-167 456 Field 20D
CFSTI Prices: HC$2.00 MF$0.50

David Taylor Model Basin, Washington, D. C.

THE INFLUENCE OF AIR-FILLED NUCLEI ON CAVITATION INCEPTION.
Revised ed.,
by M. Strasberg. May 57, 30p Rept. no. 1078
AD 132 024
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Cavitation, Nucleation), (*Nucleation, Cavitation), Air, Bubbles, Water, Diffusion, Ultrasonic detectors.

The need for nuclei in the cavitation inception process is discussed. It is shown that the characteristics of the nuclei in the water determine the critical pressure for cavitation, and accordingly, that a variation in the nuclei content may introduce scale effects into tests of cavitation inception. Evidence is presented that the nuclei in water are cavities of undissolved air. The critical pressure forthe onset of cavitation is given for several forms of air nuclei. It is shown that negative pressures are required for inception if the nuclei are small enough. Some measurements made with ultrasonic apparatus are described which seem to verify the theoretical deductions. The significance of the ultrasonic measurements and the theoretical deductions to hydraulic cavitation is discussed.

PB-167 459 Field 20H
CFSTI Prices: HC$2.00 MF$0.50

Naval Radiological Defense Lab., San Francisco, Calif.
GAMMA RAYS RESULTING FROM INTERACTIONS OF 14.7 MeV NEUTRONS WITH CARBON, NITROGEN, OXYGEN AND SILICON,
by F. C. Engesser, W. E. Thompson, and J. M. Ferguson. 23 Oct 64, 37p NRDL TR-791
AD 453 072 Unclassified report

Descriptors: (*Gamma emission, Neutron reactions), (*Neutron reactions, Gamma emission), Carbon, Nitrogen, Oxygen, Silicon, Gamma-ray cross sections, Neutron cross sections, Neutron scattering, Inelastic scattering, Nuclear energy levels.

The prompt gamma rays resulting from the interaction of 14.7 MeV neutrons with the nuclei of the elements carbon, nitrogen, oxygen and silicon, were investigated. Cross sections for the production of many of these gamma rays were measured by observing them with a carefully shielded detector during neutron bombardment of a given elemental sample. It is found that the n,n' gamma process predominates and that gamma rays resulting from the deexcitation of the lowest energy levels are generally most prominent. Other processes including n,p gamma, n, alpha-gamma and n,n' alpha-gamma are also observed. Some of the most important gamma rays such as the 6.13 MeV gamma ray from 016, the 4.43 MeV gamma ray from C12 and the 1.78 MeV gamma ray from Si28 are found to have respective production cross sections due to the n,n' gamma process of 9.95 ± 1.0, 13.13 ± 1.3 and 19.02 ± 2.7 mb/sr at 90 deg. (Author)

PB-167 467 Field 20H, 07D
CFSTI Prices: HC$1.00 MF$0.50

Enrico Fermi Inst. for Nuclear Studies, Univ. of Chicago, Ill.
MU-MESIC X-RAYS.
Quarterly status rept. for 1 Nov 64-31 Jan 65.
31 Jan 65, 13p Unclassified report

Rept. on High Energy Accelerator Program.

Descriptors: (*X-rays, Muons), (*Muons, X-rays), Hydrogen, Liquefied gases, Meson capture, Pions, Proton scattering, Polarization, Hyperfine structure, Synchrocyclotrons.

Work has continued on the following three projects: (1) Negative muon capture in liquid hydrogen, (2) pion (+) + d decays to p + p, (3) depolarization of negative muons in liquid hydrogen. The work is proceeding satisfactorily on these projects. A study is in progress on the problem of muon capture in gaseous hydrogen. (Author)

PB-167 469 Field 20D
CFSTI Prices: HC$3.00 MF$0.75

Stanford Univ., Calif. Thermosciences Div.
CONFIGURATION AND STABILITY OF A ROTATING AXISYMMETRIC MENISCUS AT LOW g,
by J. G. Seebold and W. C. Reynolds. 1 Mar 65, 90p Technical rept. no. LG-4
Grant NSF GP2720
Unclassified report

Descriptors: (*Surface properties, Liquids), (*Liquids, Capillary tubes), (*Rotation, Liquids), Hydrostatics, Stability, Configuration, Surface tension, Gravity, Bubbles, Calculus of variations.

The stability and shape of the axisymmetric meniscus are considered for a cylindrical tank rotating at constant angular velocity about its axis. The liquid properties, surface tension and density, the radius of the tank, and the axial acceleration g, are combined to form two dimensionless groups. A variational principle is developed which leads to a boundary value problem associated with the equilibrium free surface, and an eigenvalue problem associated with the stability of that surface. These are solved simultaneously as initial value problems by computerized numerical integration. It is found that rotation can have a marked effect on the stability and configuration of capillary systems. Non-wetting liquids tend to be stabilized by rotation, while wetting liquids are destabilized. The menisci of wetting liquids in zero-g become much more extended under rotation, and with sufficient rotation the meniscus undergoes a trasition to a bubble or pseudo-annular shape.

PB-167 471 Field 20E, 12A
CFSTI Prices: HC$3.00 MF$0.75

Stanford Electronics Labs., Stanford Univ., Calif.
STATISTICAL PROPERTIES OF LASER SPARKLE PATTERNS.
Interim technical rept. for Jul-Nov 63,
by Joseph W. Goodman. Dec 63, 55p
Technical rept. no. TR-2303-1, SEL-63-140
Contract AF04 695 305, Proj. 3182, Task 318201
SSD TDR-64-58; AD 436 736
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Lasers, Light), (*Light, Scattering), (*Statistical analysis, Scattering), Electric fields, Diffraction, Radar clutter, Complex variables, Fourier analysis, Statistical functions.

When laser light strikes a diffuse object, such as paper, the scattered light has been observed to possess a granular spatial structure. The statistical properties of these so-called 'sparkle patterns,' as seen by an observer in the far field of the scattering spot, are investigated. The

first order statistics of the observed electric-field strength, the observed light intensity, and the observed light phase are examined. The autocorrelation functions of the complex field andthe intensity processes are investigated, and that of the electric field is found to be proportional to the Fourier transform of the light-intensity distribution incident on the scattering surface. Spatial averages of the light intensity are considered and are found to converge to correspondingensemble averages when either the area of the scattering spot or the averaging area grows large. The influence of light spectral content on sparkle patterns is investigated in some detail. The cross correlation of patterns produced by different monochromatic light components is evaluated. The degree of correlation is found to depend on the frequency difference, the roughness of the scattering surface, the angle of incidence of the laser beam, and the position of the observer. (Author)

SC-RR-64-602 Field 20C
CFSTI Prices: HC$2.00 MF$0.50

Sandia Corp., Albuquerque, N. Mex.
A CONTROLLED THERMAL ENVIRONMENT FOR DIELECTRIC BREAKDOWN STRENGTH STUDIES,
by L. J. Seligman. Feb 65, 22p
Contract W-7405-ENG-48

Unclassified report

Descriptors: (*Dielectrics, Electric insulation), (*Insulating materials, Dielectrics).

TID-3911 (Rev 2) Field 20F
CFSTI Prices: HC$4.00 MF$0.7

Texas. Agricultural and Mechanical Univ., College Station.
THERMOLUMINESCENCE.
Bibliography,
by N. Grogler, Richard Mccall and Ernest K. Angino.
Feb 65, 108p

Unclassified report

Descriptors: (*Luminescence, Bibliographies), (*Bibliographies, Luminescence), (*Phosphorescence, Heating).

TID-21304 Field 20M, 12A
CFSTI Prices: HC$2.00 MF$0.50

Duke Univ., Durham, N. C.
A TABULATION OF THE DOPPLER INTEGRALS TAU (X,T) AND PHI (X,T),
by Kamel K. Seth and R. H. Tabony. 28 Feb 64, 32p
Contract AT(40-1)-3065

Unclassified report

Descriptors: (*Integrals, Heat transfer), (*Heat transfer coefficients, Doppler effect).

21. Propulsion and Fuels

AD-264 919 Field 21E, 01A
CFSTI Price: HC$5.00

IIT Research Inst., Chicago, Ill.
FUNDAMENTAL STUDY OF JET NOISE GENERATION AND SUPPRESSION.
Rept. for Feb-Dec 60,
ed. by W. C. Sperry. Dec 60, 194p
Contract AF33 616 6976, Proj. 3066, Task 30212
WADD TR-61-21 V1

Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Jet engine noise, Reduction), (*Exhaust nozzles, Jet engine noise), Jet plane noise, Control, Sound, Wave transmission, Mathematical analysis, Equations, Aerodynamics, Gas flow, Partial differential equations, Subsonic flow, Supersonic flow, Nonlinear systems, Turbulence, Design.

The fundamental aspects of jet noise generation and suppression are examined and evaluated. Initially, the basic equations of acoustics and fluid dynamics are considered with respect to the usual simplifying assumptions; the non-linear characteristics that lead to increased generality are emphasized. The Lighthill theory of subsonic jet stream noise and theories of supersonic jet stream noise are studies and extended. An analytical representation for the sound field surrounding a jet is provided which yields a solution giving some insight to noise generating mechanisms. Finally, a general review and analysis is provided of the experimental studies of others concerning jet noise generation and suppression. Volume I contains the technical details and Volume II is a bibliography. (Author)

NAA-SR-9781 Field 21F, 18N, 22B
CFSTI Prices: HC$3.00 MF$0.50

Atomics International, Canoga Park, Calif.
SNAP AEROSPACE SAFETY PROGRAM, PHASE I WIND TUNNEL TESTS,
by L. E. Shpiner and H. Hidalgo. 1 Feb 65, 54p
Contract AT-11-1-GEN-8

Unclassified report

Descriptors: (*Nuclear propulsion, Spacecraft), (*Spacecraft, Wind tunnels), (*Reactor safety systems, Nuclear propulsion).

N65-19272 Field 21C, 22B
CFSTI Prices:HC$1.00 MF$0.50

National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
DESCRIPTION AND OPERATION OF SPACECRAFT SERT I ION THRUSTOR FLIGHT TEST.
by Harold Gold, Raymond J. Rulis, Frank A. Maruna, Jr., and William H. Hawersaat. Mar 65, 19p
NASA-TM-X-1077

Unclassified report

Descriptors: (*Spacecraft, Flight testing), (*Ion engines, Flight testing).

The SERT I spacecraft was flown into a ballistic trajectory on July 20, 1964, by the Scout launch vehicle. The trajectory provided an experimental period of 47 minutes, during which the altitude of the spacecraft was above 250 nautical miles. The spacecraft carried two small ion thrustors and telemetered measurements of all major thrustor operating parameters. One of the thrustors operated for approximately 30 minutes, during which time the measured thrust verified the establishment of a neutral ion beam. (Author)

N65-19277 Field 21H, 22B
CFSTI Prices: HC$3.00 MF$0.75

National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
THEORETICAL BOUNDARIES AND INTERNAL CHARACTERISTICS OF EXHAUST PLUMES FROM THREE DIFFERENT SUPERSONIC NOZZLES,
by Earl H. Andrews, Jr., Allen R. Vick, and Charlotte B. Craidon. Mar 65, 82p
NASA-TN-D-260

Unclassified report

Descriptors: (*Supersonic nozzles, Exhaust gases), (*Exhaust gases, Supersonic nozzles), Rocket motor nozzles.

N65-19703 Field 21I
CFSTI Prices: HC$1.75 MF$0.75

National Aeronautics and Space Administration, Washington, D. C.
HIGH ENERGY PROPELLANTS-A CONTINUING BIBLIOGRAPHY.
Mar 65, 104p NASA-SP-7002(01)

Unclassified report

Descriptors: (*Rocket propellants, Bibliographies), (*Bibliographies, Rocket propellants), (*Oxidizers, Bibliographies).

PB-167 420 Field 21D, 07C, 07E, 10C
CFSTI Prices: HC$2.00 MF$0.50

American Oil Co., Whiting, Ind.
BASIC STUDY OF SORPTION OF ORGANIC FUELS DURING OXIDATION AT ELECTRODES.
Quarterly rept. no. 11,
by Robert J. Flannery, Gerald Aronowitz, Ahmad Sam, and Donald C. Walker. Jul 64, 33p Rept. no. M64-204
Contract DA11 022ORD4023, Proj. 3472, ARPA Order 247-62, Task 5
AROD 3472:3; AD 444 431

Unclassified report

Descriptors: (*Fuels, Oxidation), (*Fuel cells, Electrodes), (*Sorption, Electrodes), (*Electrodes, Sorption), Electrochemistry, Tracer studies, Butane, Radioactive isotopes, Labeled substances, Adsorption, Metal films, Platinum, Adhesion, Hydrocarbons.

Studies of the sorption of radio-n-butane on a thin film platinum electrode in 1N H_2SO_4 at 25 C and at potentials in the range of 0 to 1.5V (NHE) were continued. Maximum adsorption occurs at about +0.4V (NHE), near the zero charge potential. At lower concentration of butane, coverage decreases and the potential of maximum adsorption shifts to more negative values. Fractional coverage was not determined but was estimated to be of the order of tenths. Use of tantalum underlayment to improve the adhesion of platinum film electrodes to mica has given promising preliminary results. Capacitance work directed toward the temperature dependence of methanol adsorption continued, with emphasis on the state of the electrode surface resulting from electrode pretreatment and potential programming. Greatest reproducibility of capacity values results from prolonged pretreatment near hydrogen evolution and avoidance of the oxide region. A sputtered platinum on platinum-foil electrode gave capacity-potential behavior qualitatively similar to that found for bright platinum which indicated a surface roughness for the sputtered and annealed film of about 10. (Author)

PB-167 437 Field 21C, 21D
CFSTI Prices: HC$3.00 MF$0.75

General Electric Co., Cincinnati, Ohio.
EFFECTS OF IMPURITIES OF CESIUM FUEL UPON ION ENGINES.
Rept. for 1 Jun 62-15 Apr 63,
by B. C. Merten, A. Skerbele, and M. L. Bromberg.
Jun 63, 54p
Contract AF33 657 9163, Proj. 3048, Task 304804
ASD TDR-63-476 P1; AD 416 449

Unclassified report

See also AD-603 631.

Descriptors: (*Ion engines, Fuel contamination), (*Fuel contamination, Ion engines), (*Cesium, Fuels), Impurities, Temperature, Ionization, Chemisorption, Porous metals, Tungsten, Silicon, Titanium, Iron, Nickel, Chromium, Aluminum, Lead, Alkali metals, Lithium, Sodium, Potassium, Rubidium, Barium, Magnesium, Aluminum, Copper, Tin, Zinc, Oxygen, Contamination, Vapor pressure.

The presence of certain impurities in cesium fuel raises the critical temperature of ionization on a particular emitter surface, thereby decreasing the thermal efficiency of the surface ionization ion engine. Critical temperature curves of cesium with selected impurities are compared to those of pure cesium on the same porous tungsten emitter surface. The effect of the impurities is then determined by any deviation in the curves. (Author)

22. Space Technology

PB-167 328 Field 22B
CFSTI Prices: HC$3.00 MF$0.75

IIT Research Inst., Chicago, Ill.
RESEARCH AND DEVELOPMENT OF DESIGN CONCEPTS FOR SEALING APPLICATIONS IN AEROSPACE VEHICLE CABINS.
Rept. for 1 Apr 60-15 Dec 61,
by Joseph S. Islinger. Feb 62, 75p
Contract AF33 616 7194, Proj. 1368, Task 13806
ASD TR-61-696

Unclassified report

Descriptors:(*Seals (Stoppers), Design), (*Spacecraft cabins, Seals (Stoppers)), Space environmental conditions, Vacuum, O-rings, Electrical conductance, Shafts, Elastomers, Manufacturing methods.

The report describes the development of near absolute sealing techniques for small openings, such as for electrical conductors, reciprocating and rotating shafts, and hatches in the walls of flight vehicle cabins. The need for absolute sealing stems from the requirement of a habitable environment in such vehicles for periods as long as one year under differential pressure and temperature extremes from -100 to +500F. The considerations underlying selection of suitable seal materials for resistance to the space environment, comprising radiation, high vacuum, temperature and static and dynamic loading, are discussed. The mechanical design and material factors considered conducive to and studies leading to a definition of absolute sealing are also discussed. Special investigations concerned with effect of elastomer permeability upon seal behavior and with techniques for adequately sealing electrical wires and cables were undertaken and are described. The developed seal concepts for each of the four sealing

applications considered are described in detail and results of the evaluation tests performed under simulated environmental conditions in a high-vacuum environmental facility are presented. Recommendations are made for space vehicle cabin applications. (Author)

PB-167 421 Field 22B, 10B
CFSTI Prices: HC$4.00 MF$1.00

Aerospace Corp., Los Angeles, Calif.
SPACE VEHICLE POWER SOURCES HANDBOOK,
by Rex A. Barney. 21 May 64, 130p
Rept. no. TDR-269(4710-17)-2
Contract AF04 695 269
SSD TDR-64-8; AD 441 574
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Spacecraft, Power supplies), (*Power supplies, Handbooks), Space propulsion, Solar cells, Thermionic convertors, Thermoelectricity, Fuel cells, Magnetohydrodynamics, Nuclear energy, Energy conversion, Storage, Generators, Turbines.

Future Air Force missions are analyzed to obtain space vehicle power requirements, and power systems are suggested for these projectedprograms. Basic principles of operation of energy conversion devices such as fuel cells and solar cells are briefly explained. Energy conversion systems are categorized by availability or development status, i.e., currently-available, under study, or advanced (early stage of applied research) concepts. A description of each device is given, along with the specific power, power level, and duration that might be expected. Power transmission, energystorage, radiators, and turbines are also included as separate items of discussion. An extensive bibliography is provided. (Author)

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